REPORT NUMBER 147
MARCH 1964

MAIN LANDING GEAR DROP TEST REPORT

XV-5A

LIFT FAN FLIGHT RESEARCH AIRCRAFT PROGRAM

CONTRACT NUMBER DA44-177-TC-715

GENERAL ELECTRIC

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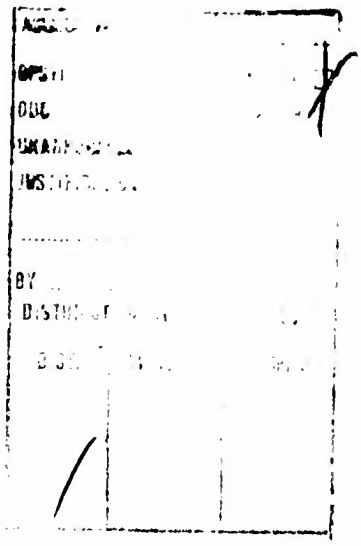
REPORT NUMBER 147
MARCH, 1964



MAIN LANDING GEAR

DROP TEST REPORT

XV-5A LIFT FAN

FLIGHT RESEARCH AIRCRAFT PROGRAM

ADVANCED ENGINE AND TECHNOLOGY DEPARTMENT

GENERAL ELECTRIC COMPANY

CINCINNATI, OHIO 45215

1510LTR-1	DROP TEST REPORT H. W. LOUD MACHINE WORKS, Inc POMONA CALIFORNIA	Page 1

REVISIONS

Date	Change Letter	Description	Approvals
11-6-63	A	Page 2: Added Appendix "A" Drop Test Requirements Added Appendix "B" Basic Strut Air Pressure Curve Page 5: Corrected Mass Travel Values Added: Aircraft Configuration Aircraft Sign Convention Notes 167 Psig Drop Test Inflation Pressure. "See also Appendix "B" Page 9: Added: 167 Psig Inflation Pressure Page 10: Added: 167 Psig Inflation Pressure Page 11: Added: 167 Psig Inflation Pressure Page 12: Added: 167 Psig Inflation Pressure Pages 13, 14, 15, & 16: Added Calibration Values. 167 Psig Inflation Pressure	11/6/63

H. W. LOUD MACHINE WORKS, Inc.
POMONA, CALIFORNIA

TABLE OF CONTENTS

1.0 GENERAL:

The shock absorber portion of the 1510L100 Main Landing Gear, but using a dummy cylinder was tested on 2 August 1963, in accordance with the H. W. Loud Test Procedure 1510LTP-4, Revision "A". This report presents the successful completion of the established test requirements.

The tests were witnessed by H. W. Loud Quality Control and Mr. Heinz J. Kowaczek of Federal Aviation Agency.

2.0 APPLICABLE DOCUMENTS:

2.1 1510LTP-4, Revision "A , H. W. Loud Drop Test Procedure.

2.2 SCDL0001, Ryan Main Gear Specification.

3.0 SUMMARY:

The results of the tests demonstrate satisfactory energy absorption characteristics of the shock absorber. (See Table I)

4.0 DISCUSSION:

The shock absorber was mounted in the drop tower (See Figure I). The ground reactions were measured with a reaction platform (See Figure II). The strut was serviced with hydraulic fluid and extended with 167 psig air pressure. The tire was inflated to 180 psig.

The tests were performed in accordance w th the 1510LTP-4, Revision "A" Test Procedure. See Appendix "A" for a copy of the test requirements taken from the procedure.

Figure III shows the configuration of the metering pin and orifice.

5.0 RESULTS:

The test results are given in Table I. The curves of vertical load vs stroke and vertical load vs mass travel after contact are given in Figures IV, V, VI, and VII. The actual test oscillograph traces are fold out pages.

H. W. LOUD MACHINE WORKS, Inc.
POMONA, CALIFORNIA

TABLE I

Drop Series Record No.	3 9770	1 9772	2 9785	4 9787
Aircraft Configuration	2 PT Level Gear Fwd. 12500 lb.	2 PT Level Gear Fwd. 9200 lb.	Tail Down Gear Fwd. 9200 lb.	2 PT VTOL Gear Aft 9200 lb.
Drop Height (Inches)	6.80	18.70	18.70	18.70
Actual Jig Wt. (lbs)	6238	4638	4638	4638
Energy Absorbed (Ft. lbs)	2983	5985	6210	6363
Wheel Speed (rpm)	2292	1971	1971	0
Sinking Velocity (Ft/sec)	6	10	10	10
Mass Travel (Inches)	6.89	8.61	8.37	9.35
Tire Deflection (Inches)	1.52	1.64	1.65	1.66
Oleo Stroke (Inches)	5.54	7.02	6.78	7.50
Platform Vert. Reaction (lbs)	7050	11370	12100	10840
Plat. Drag Fore Reaction (lbs) Aft	1450 3270	2820 4090	2000 4640	0
Strut Efficiency (%)	81.4	82.4	81.3	83.6

(a) 167 psig drop test inflation pressure

(b) See also Appendix "B"

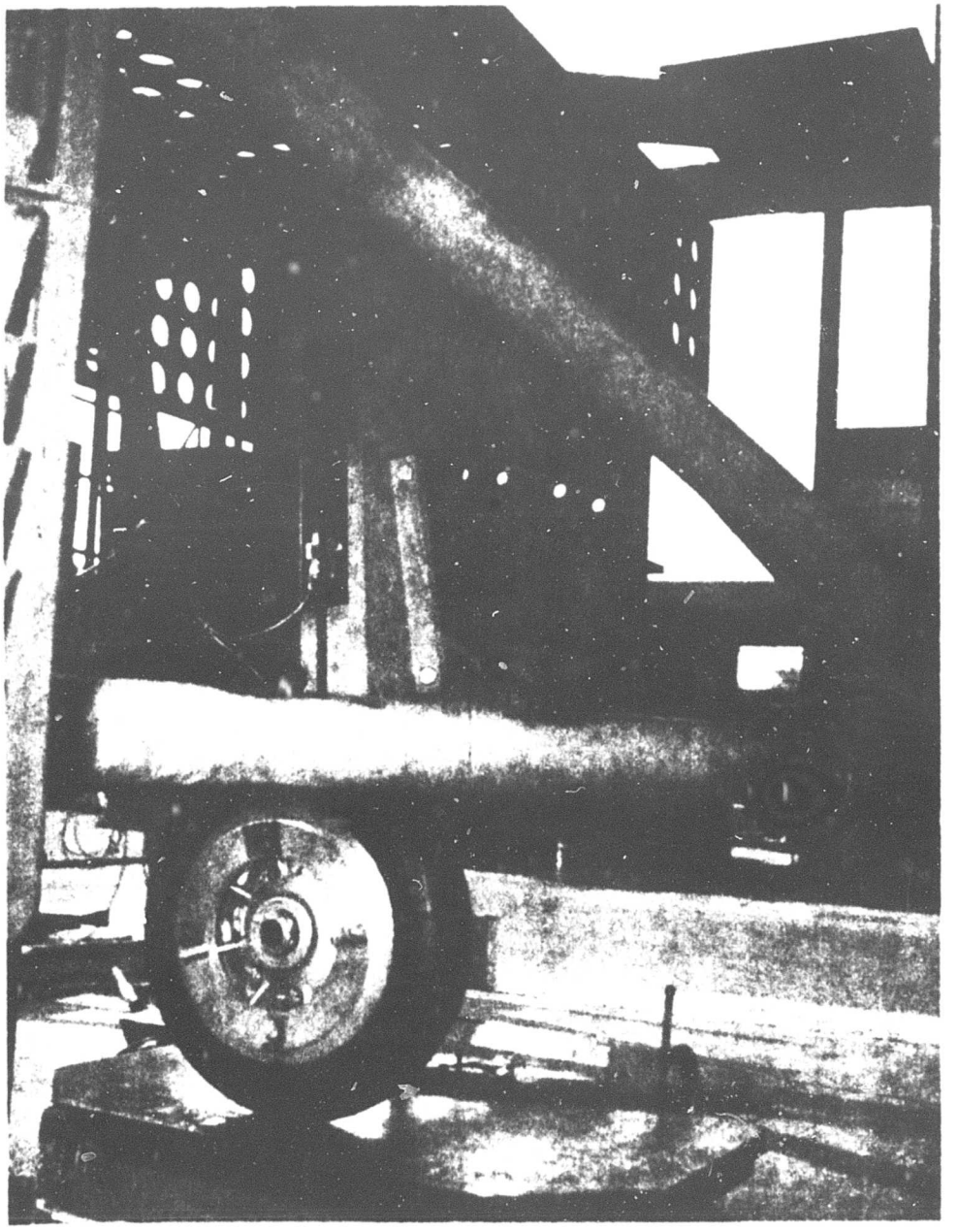


FIGURE I
DROP TEST TOWER
XV5A MAIN LANDING GEAR

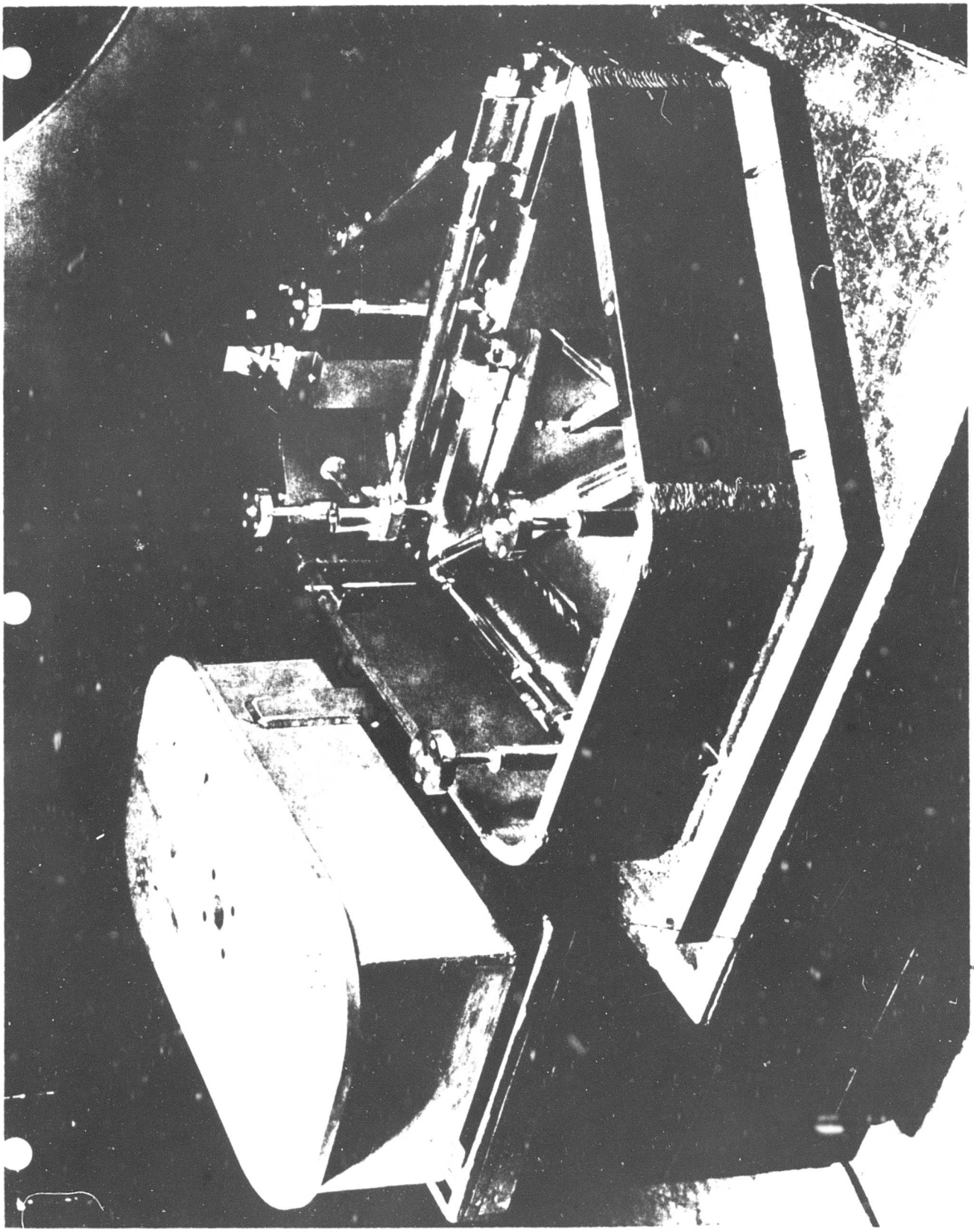
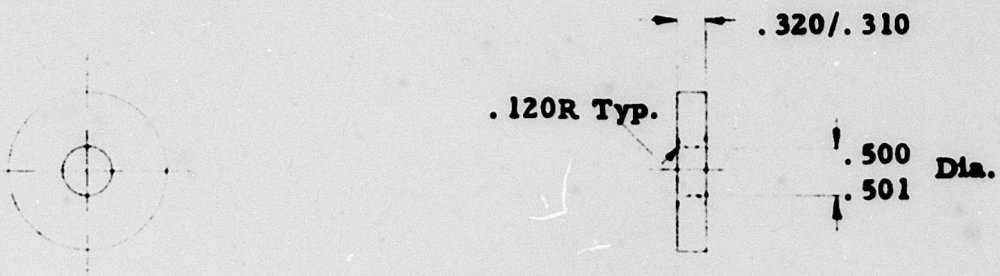


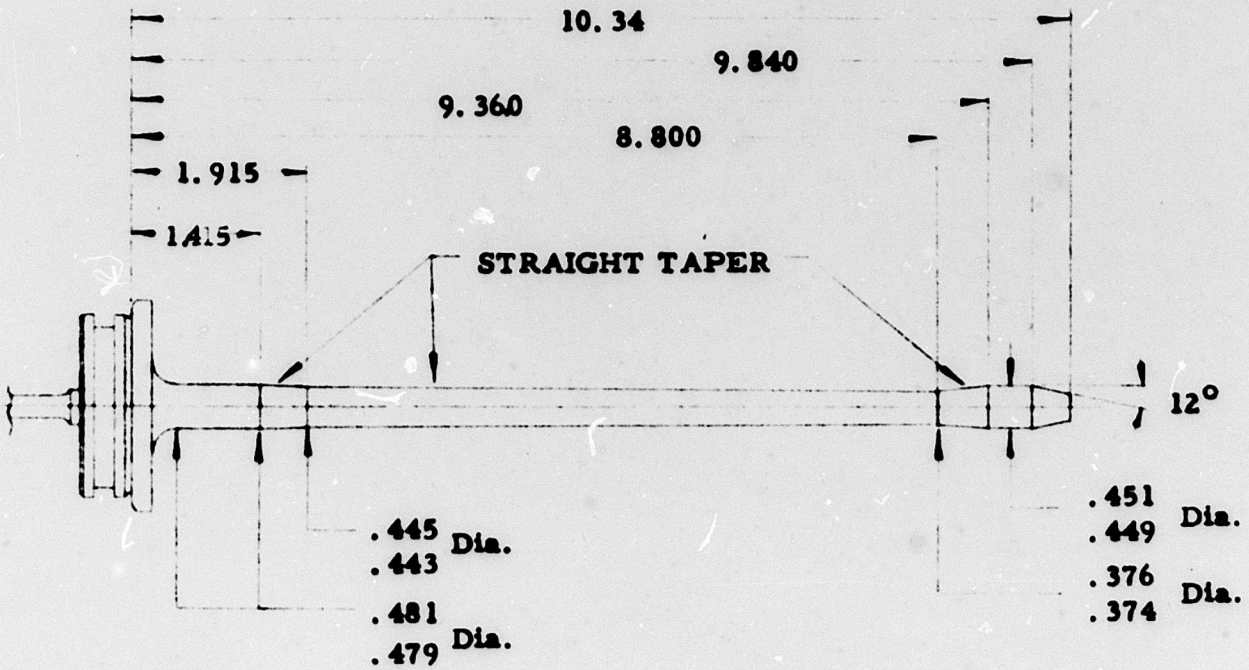
FIGURE II
REACTION PLATFORM

H. W. LOUD MACHINE WORKS, Inc.
POMONA, CALIFORNIA

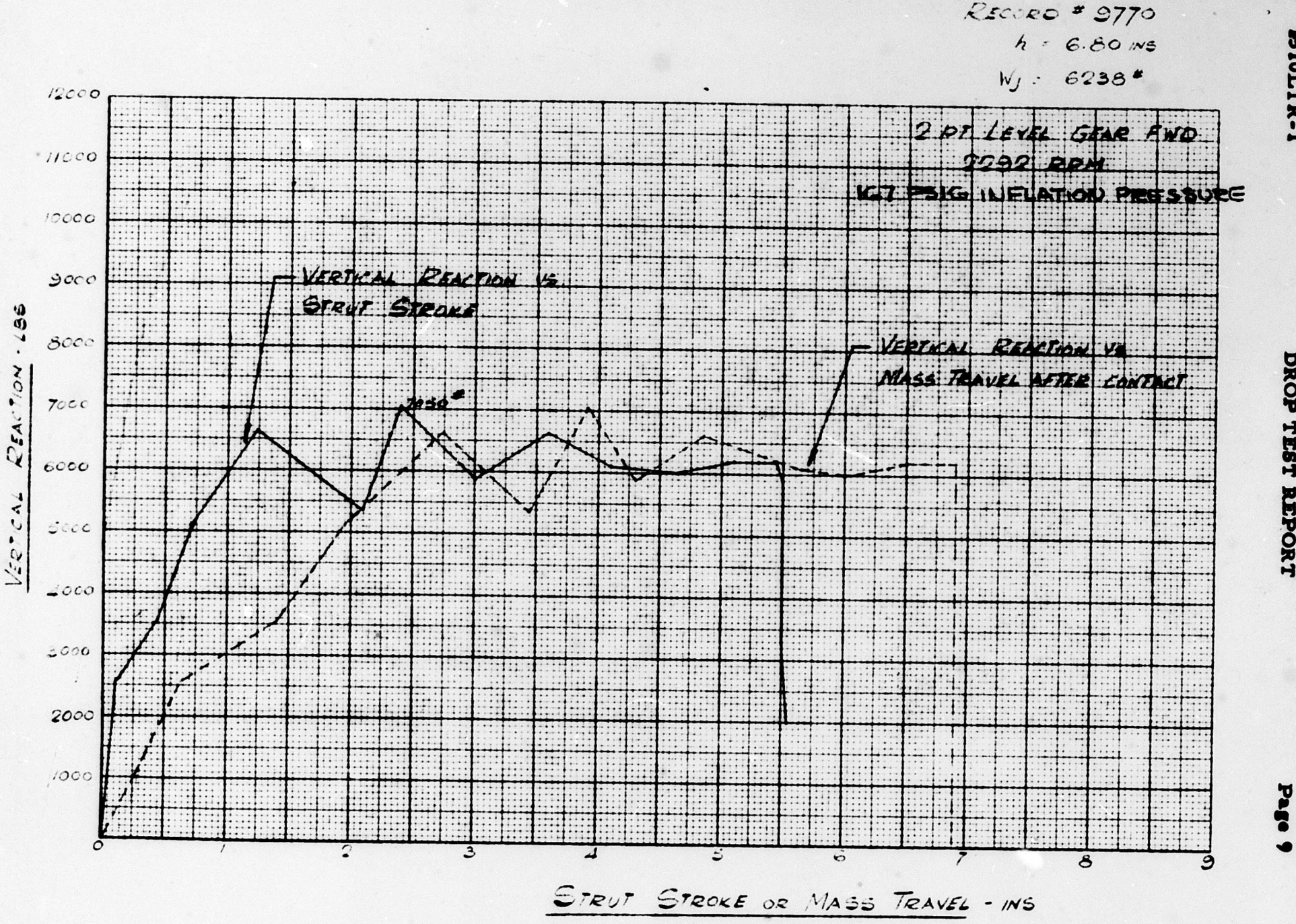
FIGURE III



1510L115 ORIFICE CONFIGURATION (HALF SIZE)



1510L112 METERING PIN CONFIGURATION (HALF SIZE)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Wj = 6238#
2 PT LEVEL GEAR FWD
2292 RPM
167 PSIG INFLATION PRESSURE
VERTICAL REACTION VS. STRUT STROKE
VERTICAL REACTION VS. MASS TRAVEL AFTER CONTACT
7950#
VERTICAL REACTION - LBS
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1
2
3
4
5
6
7
8
9
STRUT STROKE OR MASS TRAVEL - INS

FIGURE IV

RECORD # 9772
h = 18.70 INS
Wj = 4638 #

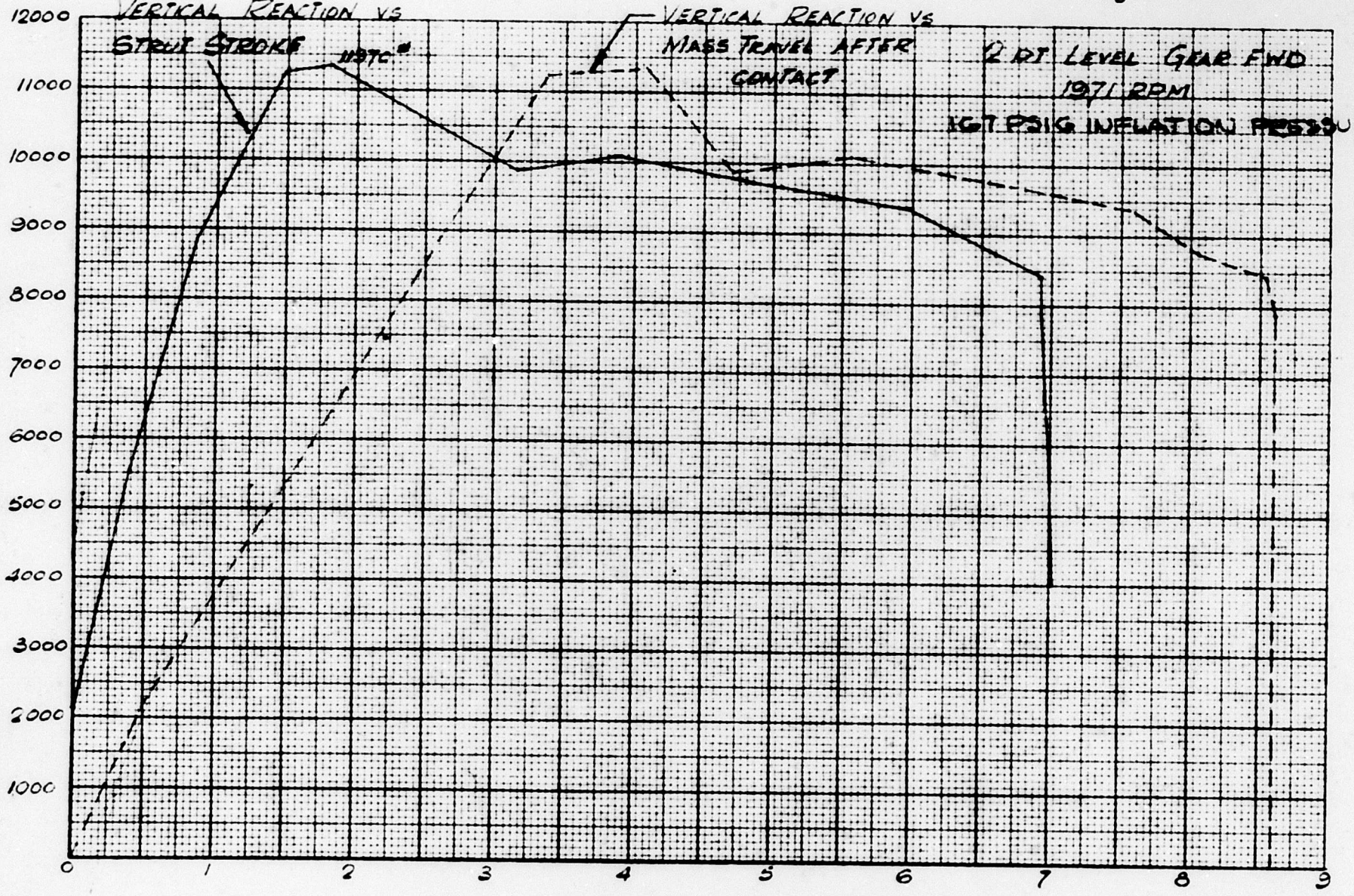


FIGURE V

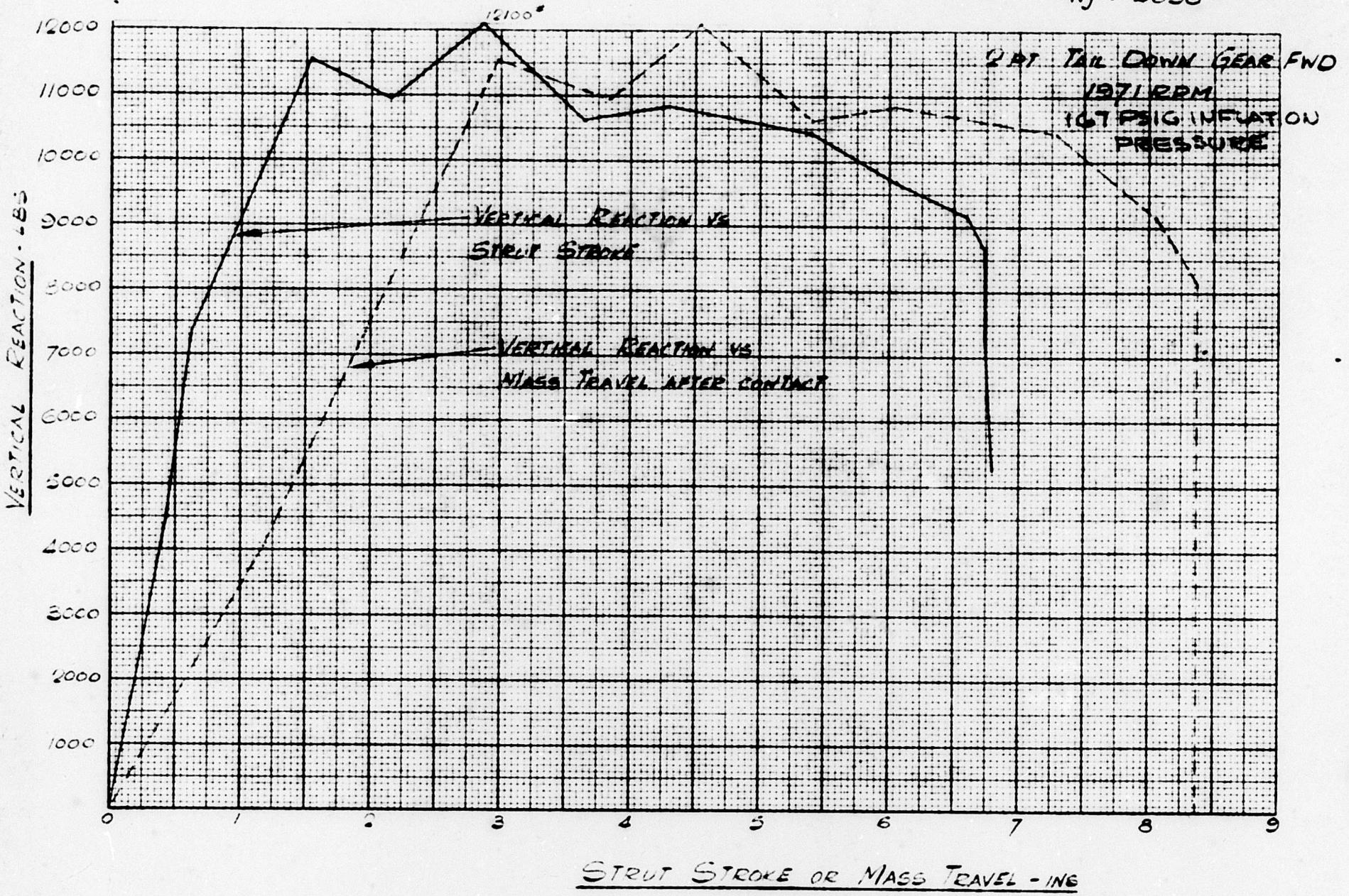

RECORD # 9785
n = 18.70 INS
Wj = 1638 #
12100#
2 PT TAIL DOWN GEAR FWD
1971 RPM
167 PSIG INFLATION PRESSURE
VERTICAL REACTION VS STRUT STROKE
VERTICAL REACTION VS MASS TRAVEL AFTER CONTACT
VERTICAL REACTION - LBS
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1
2
3
4
5
6
7
8
9
STRUT STROKE OR MASS TRAVEL - INS

FIGURE VI

RECORD #9787
h = 18.70 INS
Wj = 2638 #

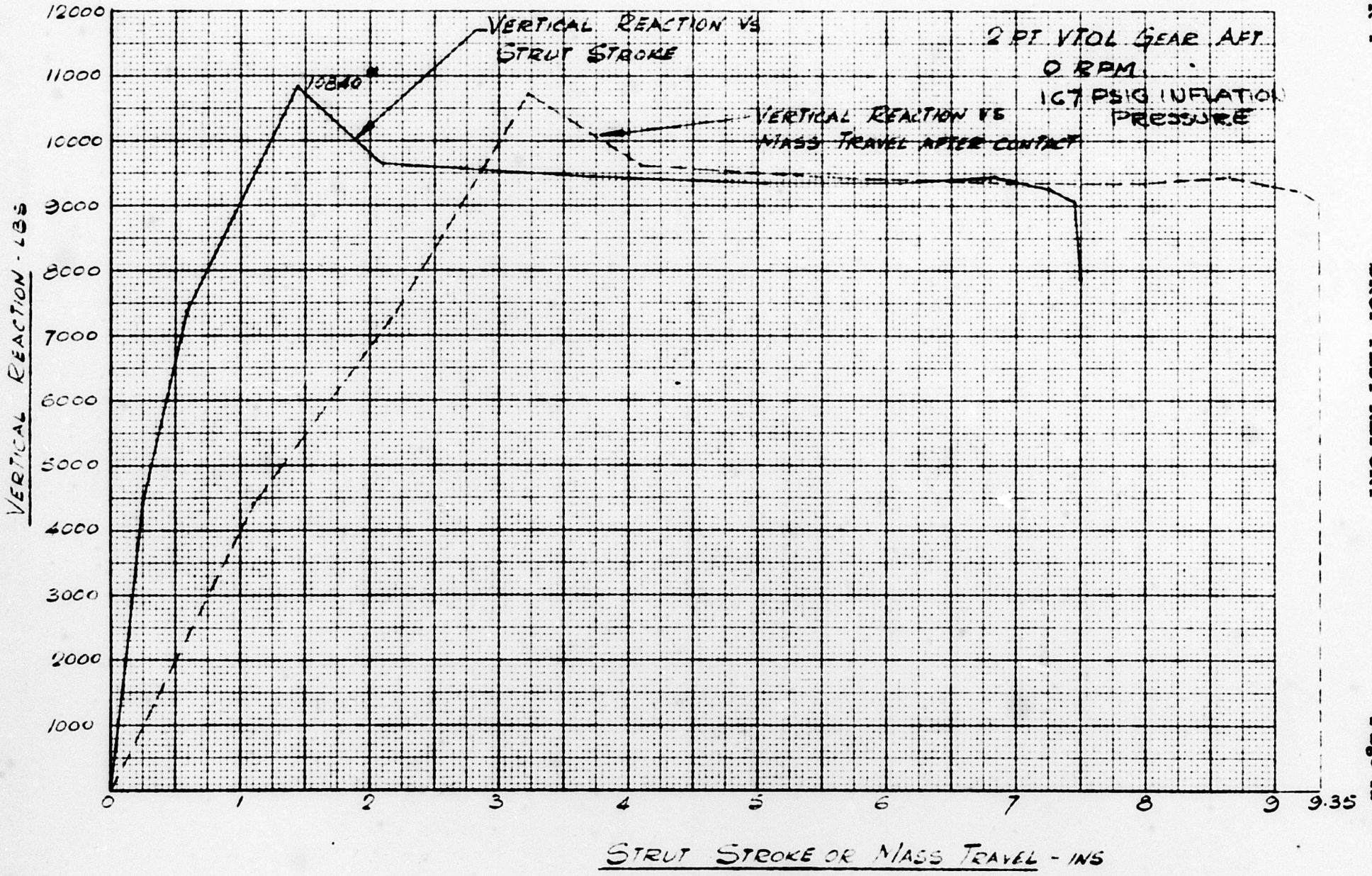
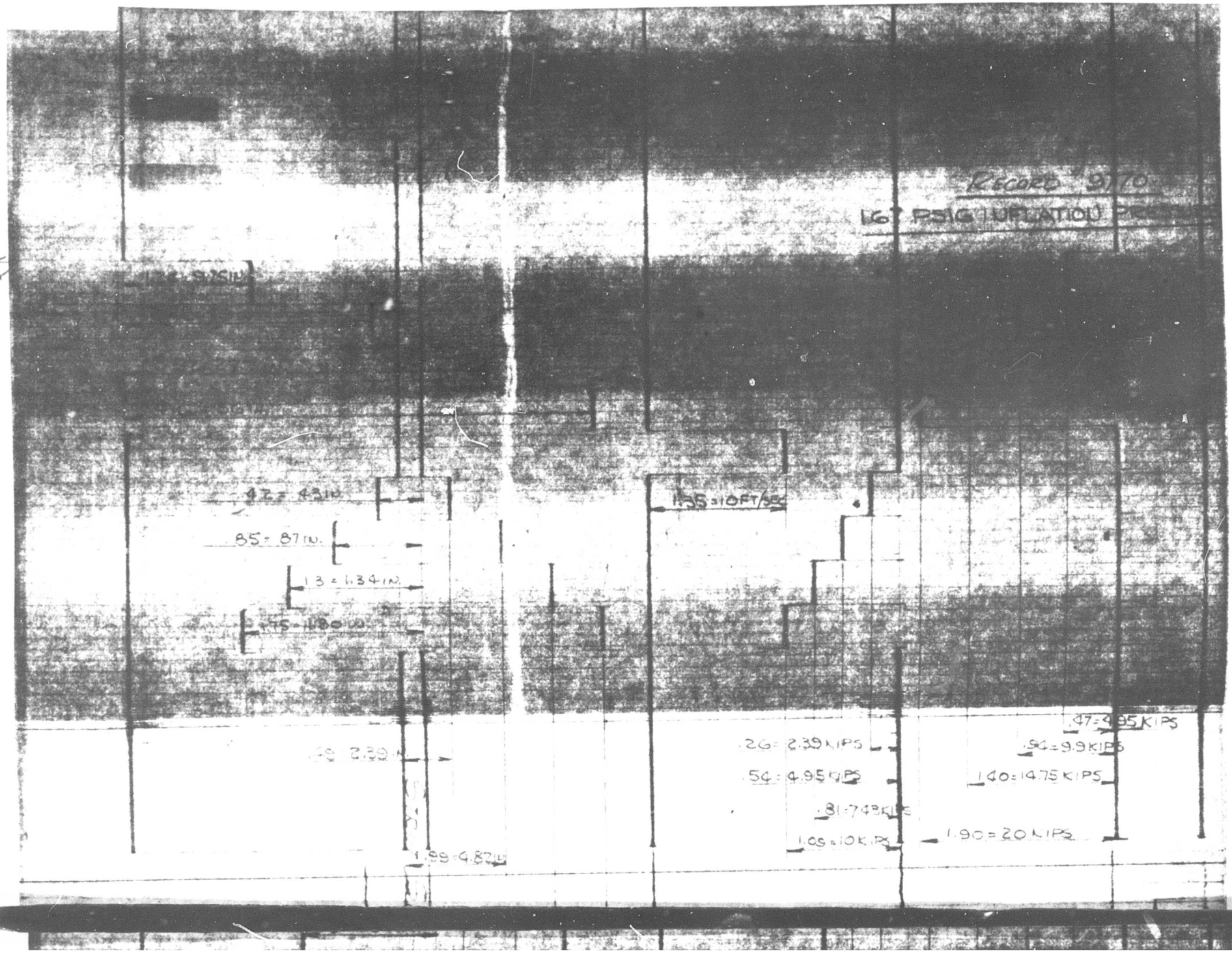
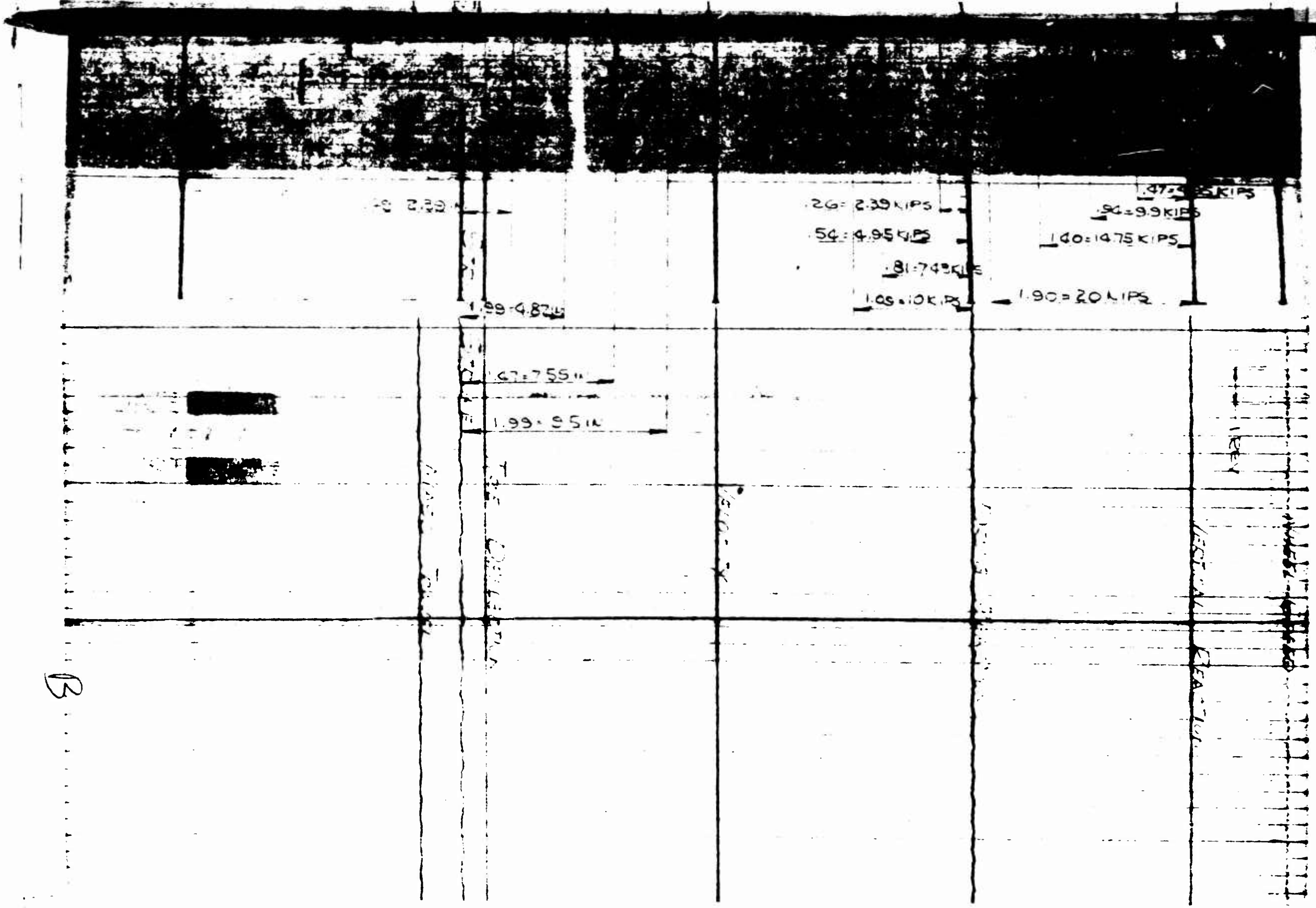


FIGURE VII


RECORD 9710
.42 = 4.31 IN.
.85 = 8.7 IN.
1.3 = 1.34 IN.
1.99 = 4.87 IN.
1.35 = 10 FT/SEC
.26 = 2.39 KIPS
.54 = 4.95 KIPS
.81 = 7.43 KIPS
1.08 = 10 KIPS
.47 = 4.95 KIPS
.96 = 9.9 KIPS
1.40 = 14.75 KIPS
1.90 = 20 KIPS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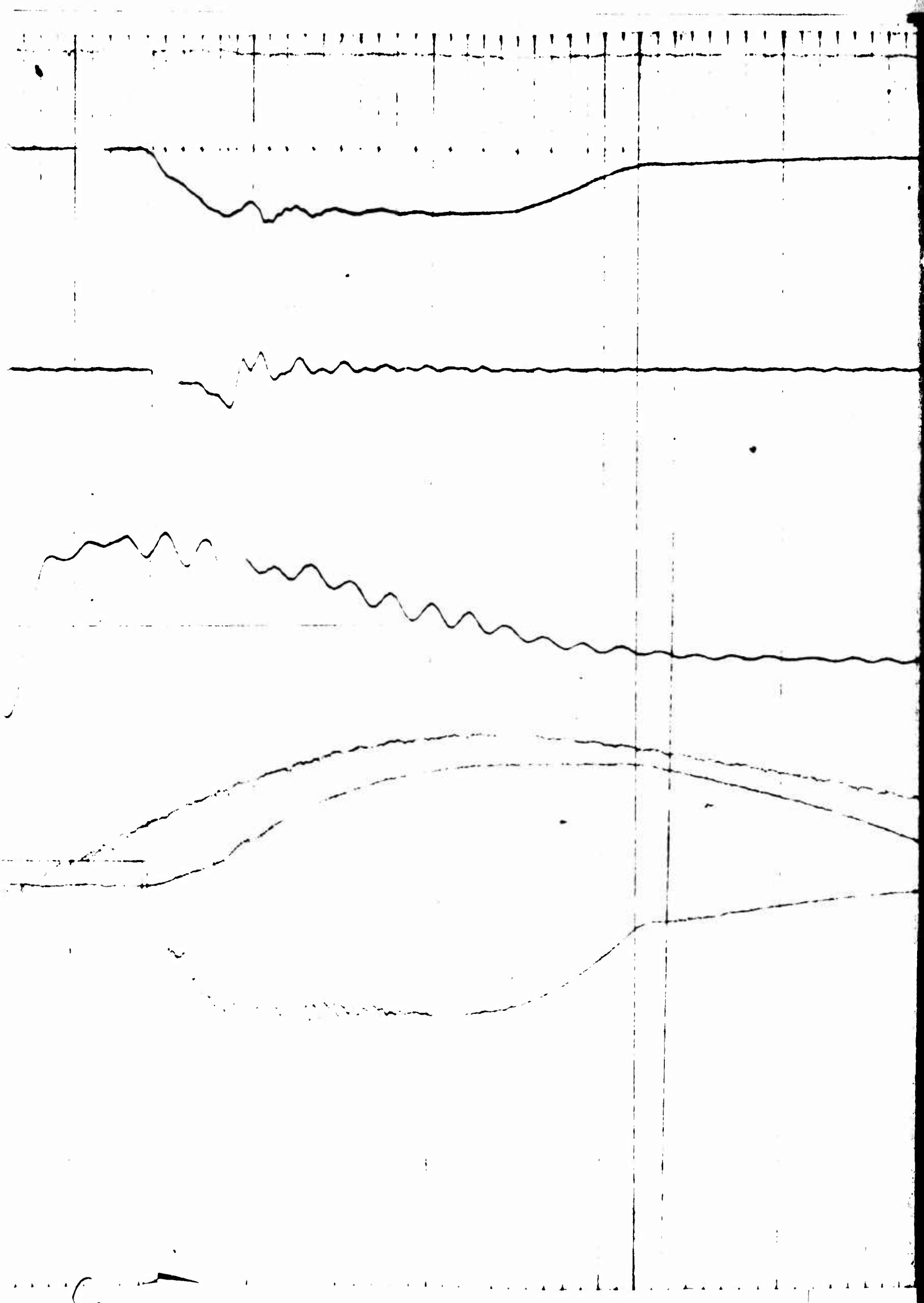
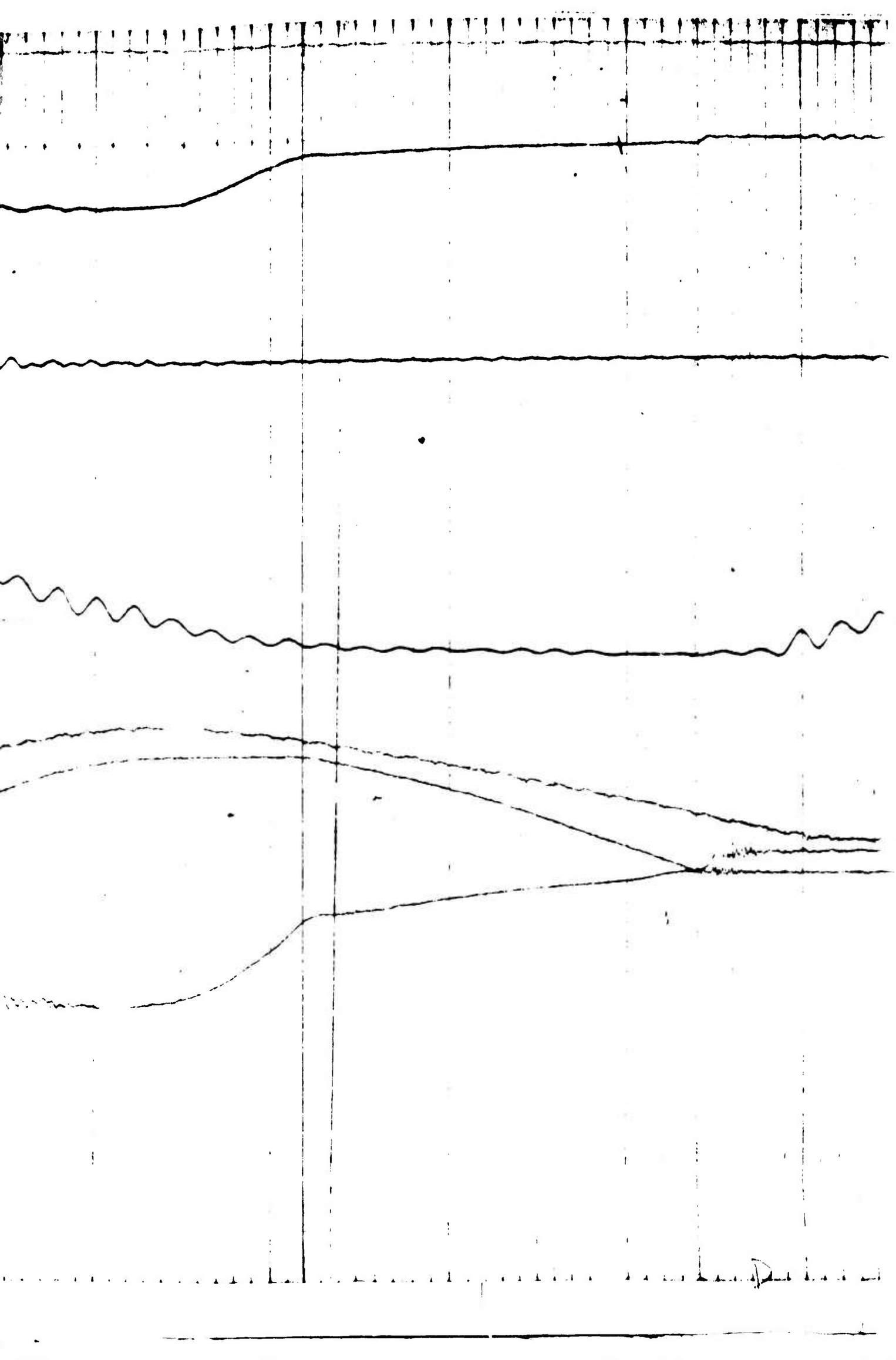
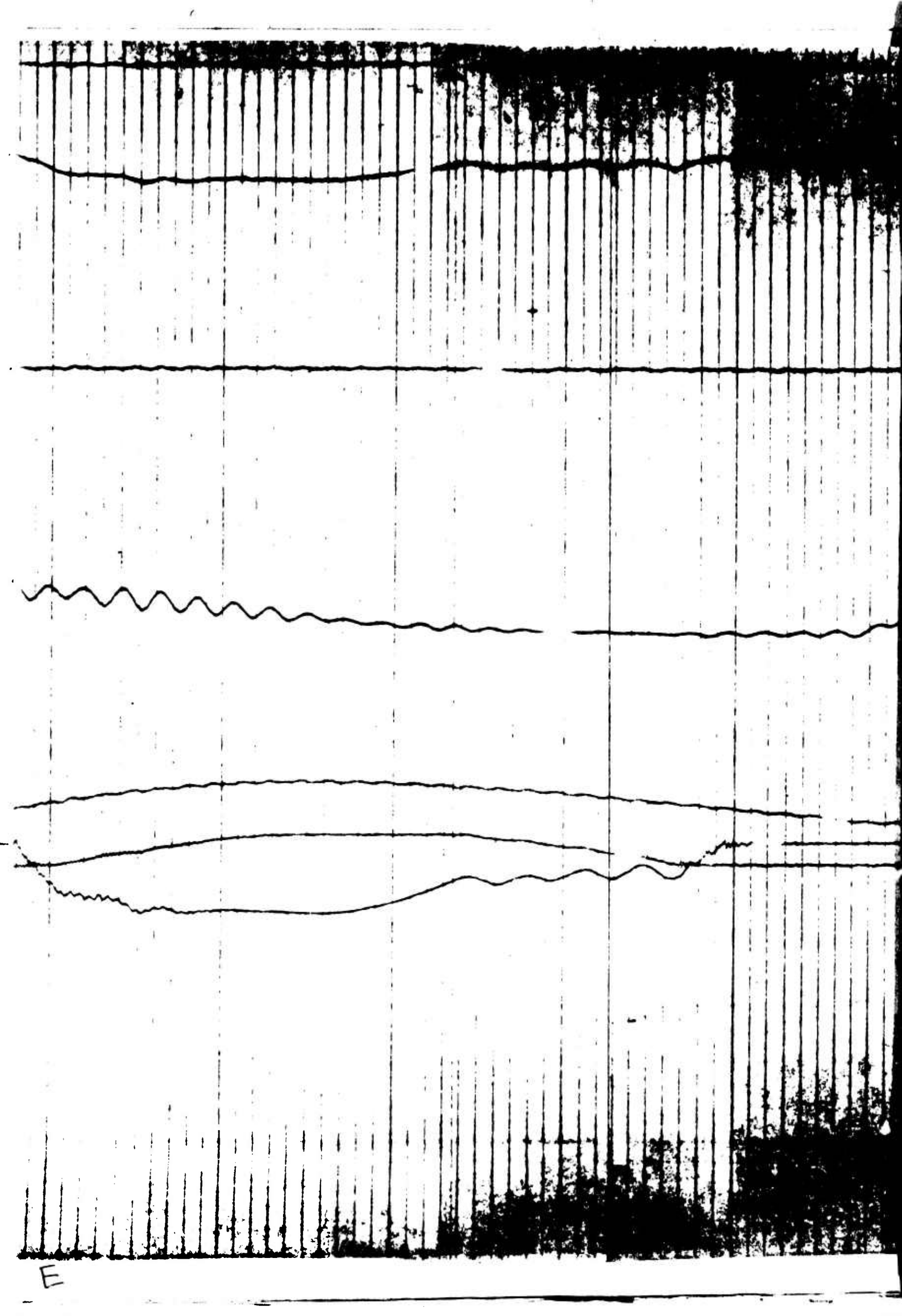
.54= 4.95 KIPS
.81=7.43 KIPS
1.08=10 KIPS
1.90=20 KIPS
.94=9.9 KIPS
1.40=14.75 KIPS
1.99=4.82 KIPS
.67=7.55 IN
1.99=9.5 IN
B



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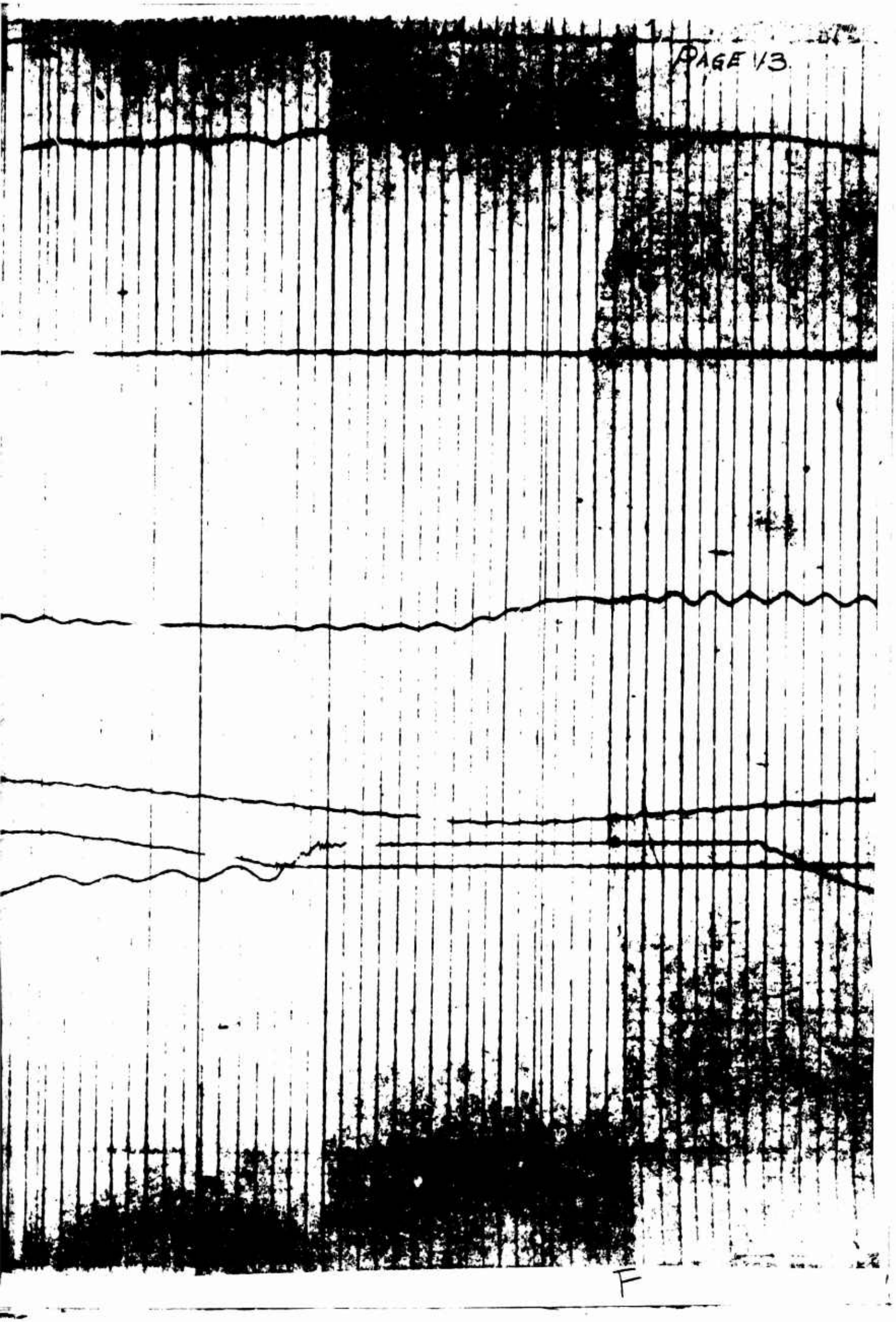
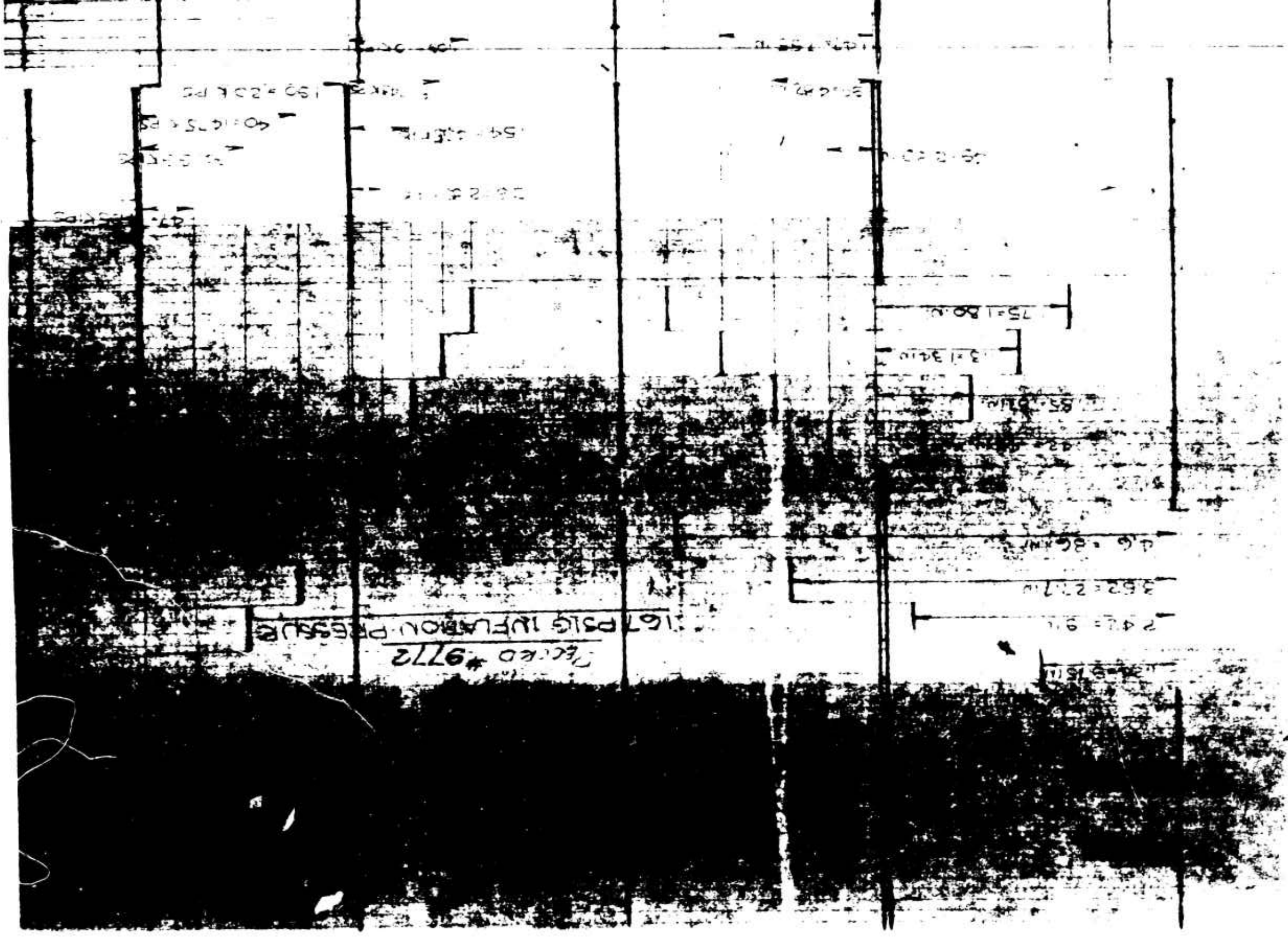
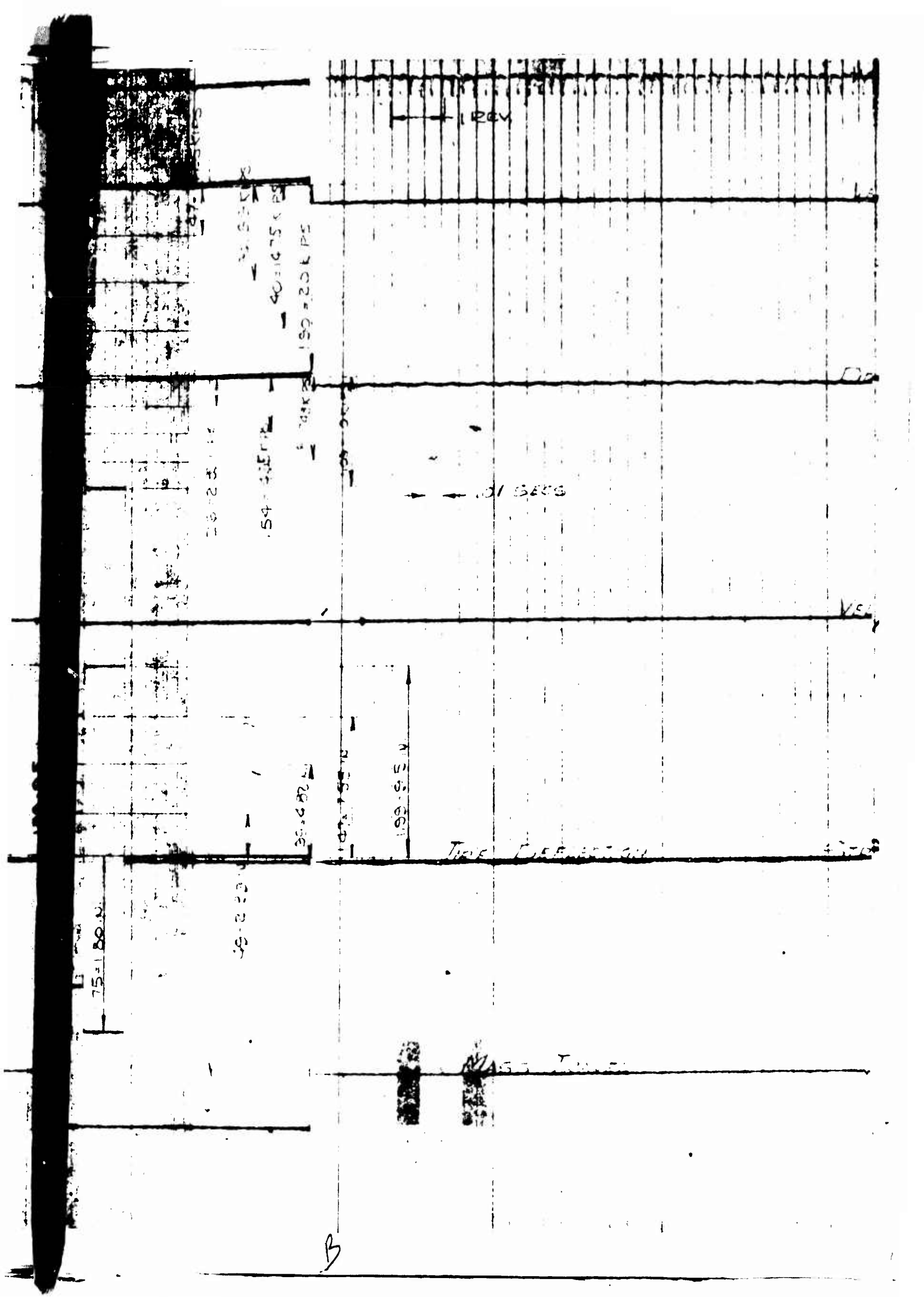
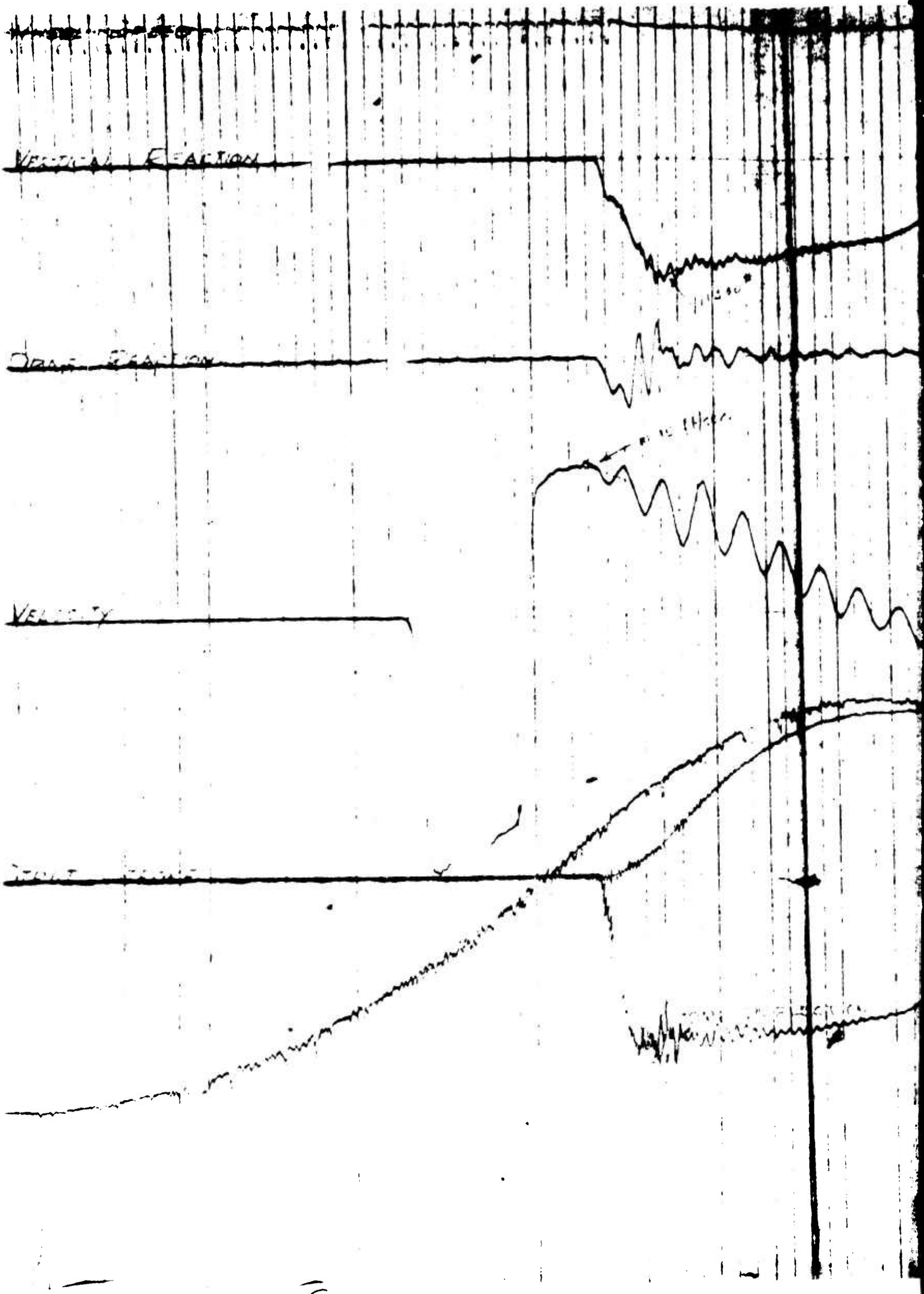
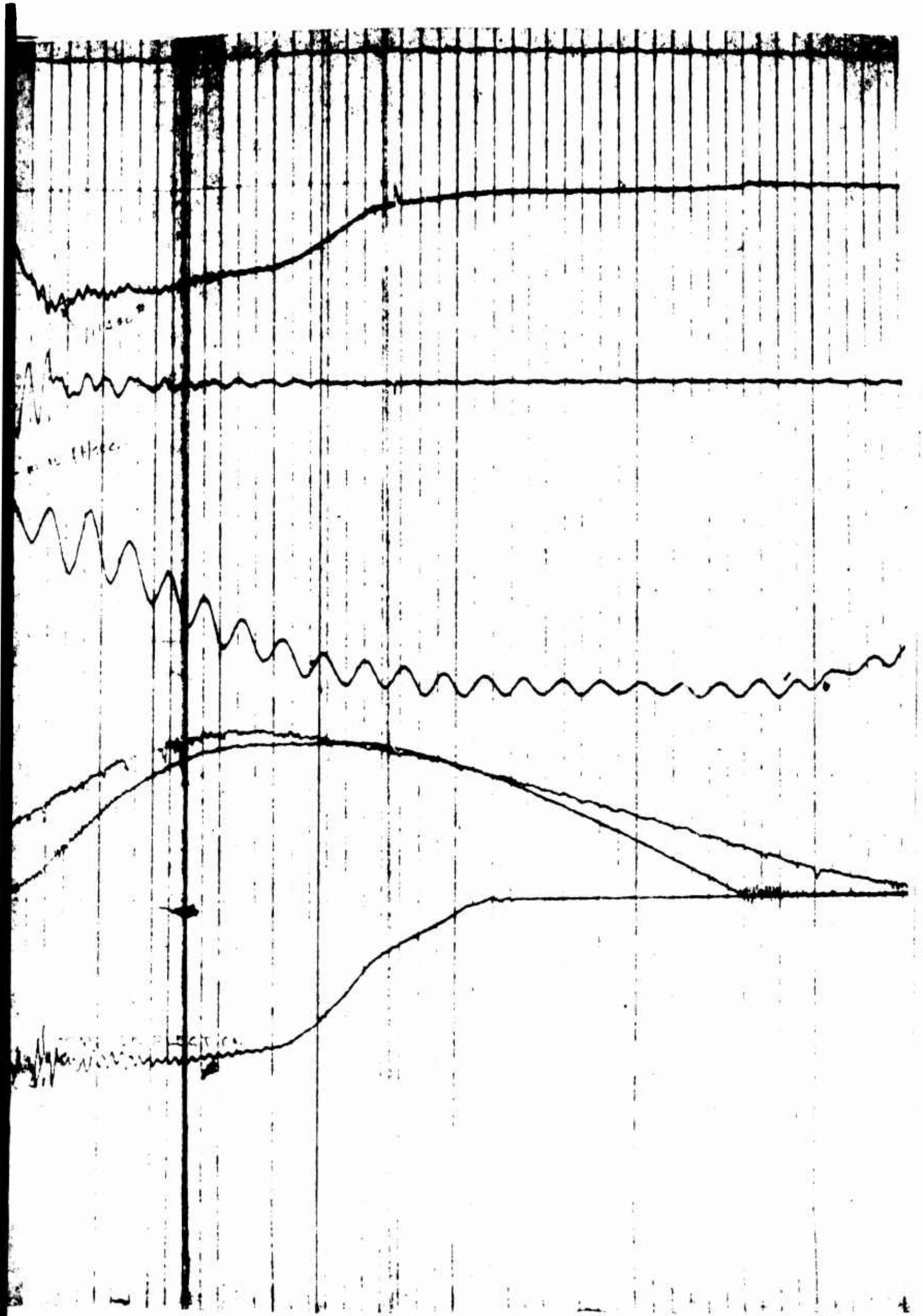







VERTICAL ACCELERATION
VELOCITY



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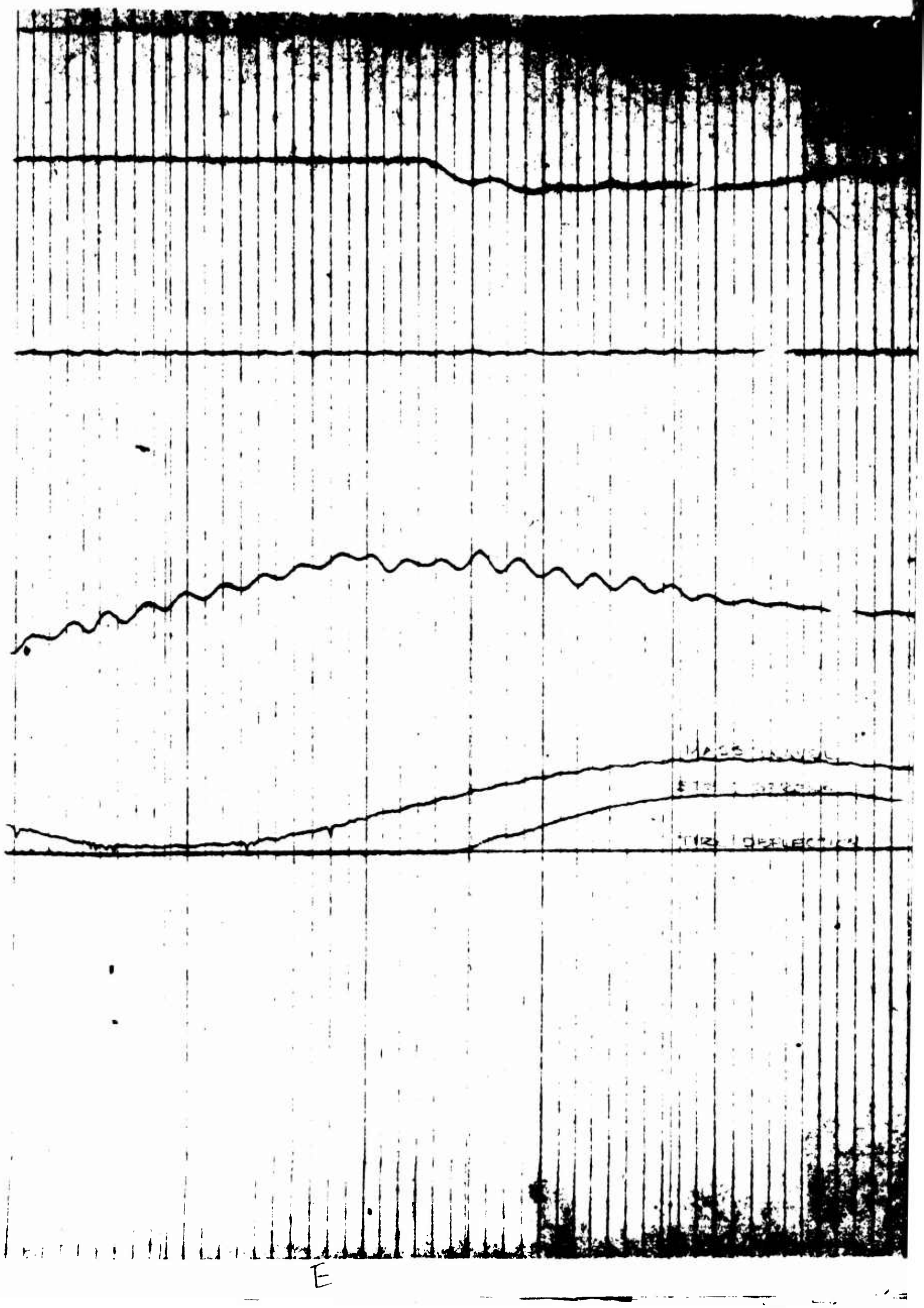
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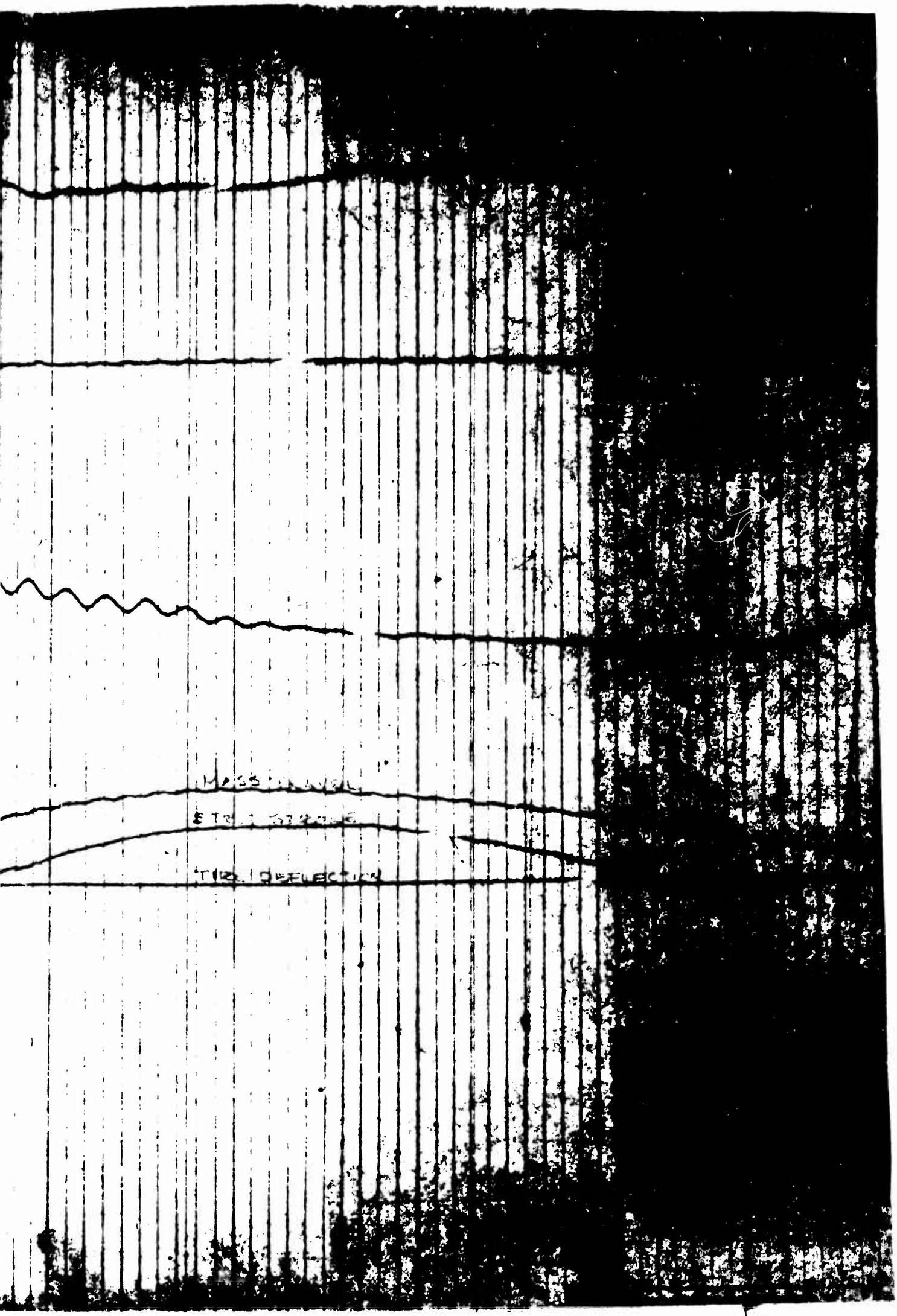
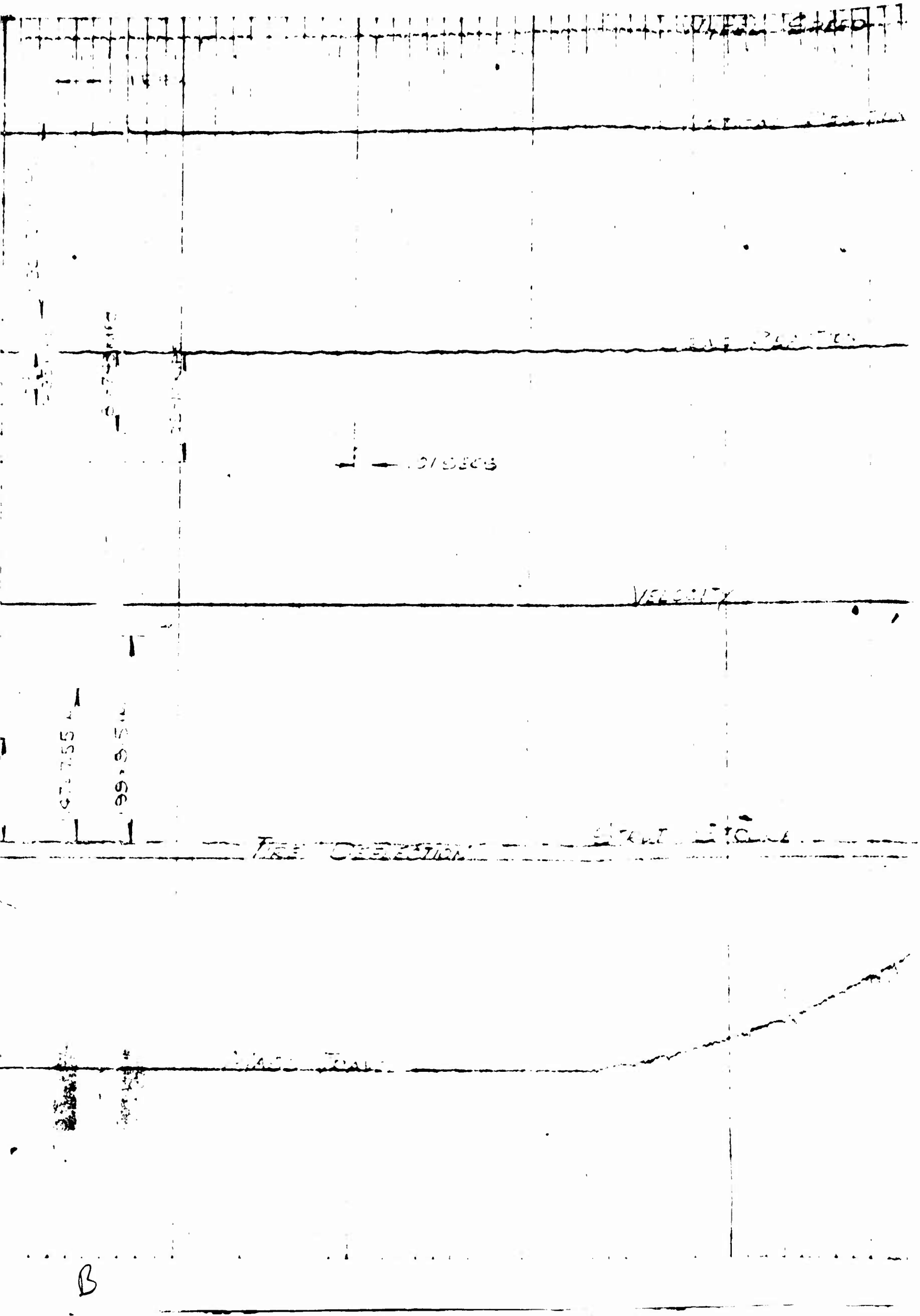
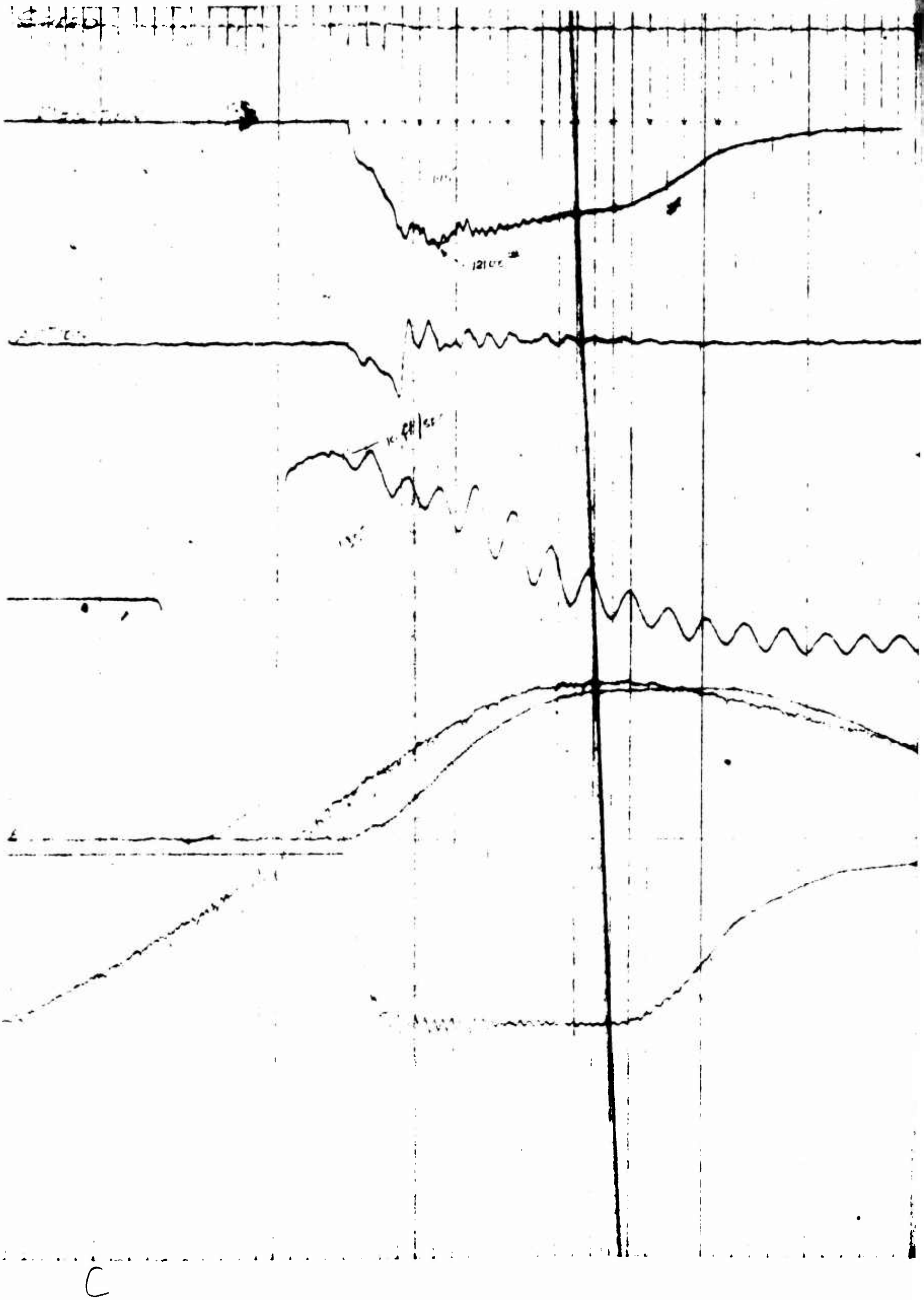



VELOCITY
B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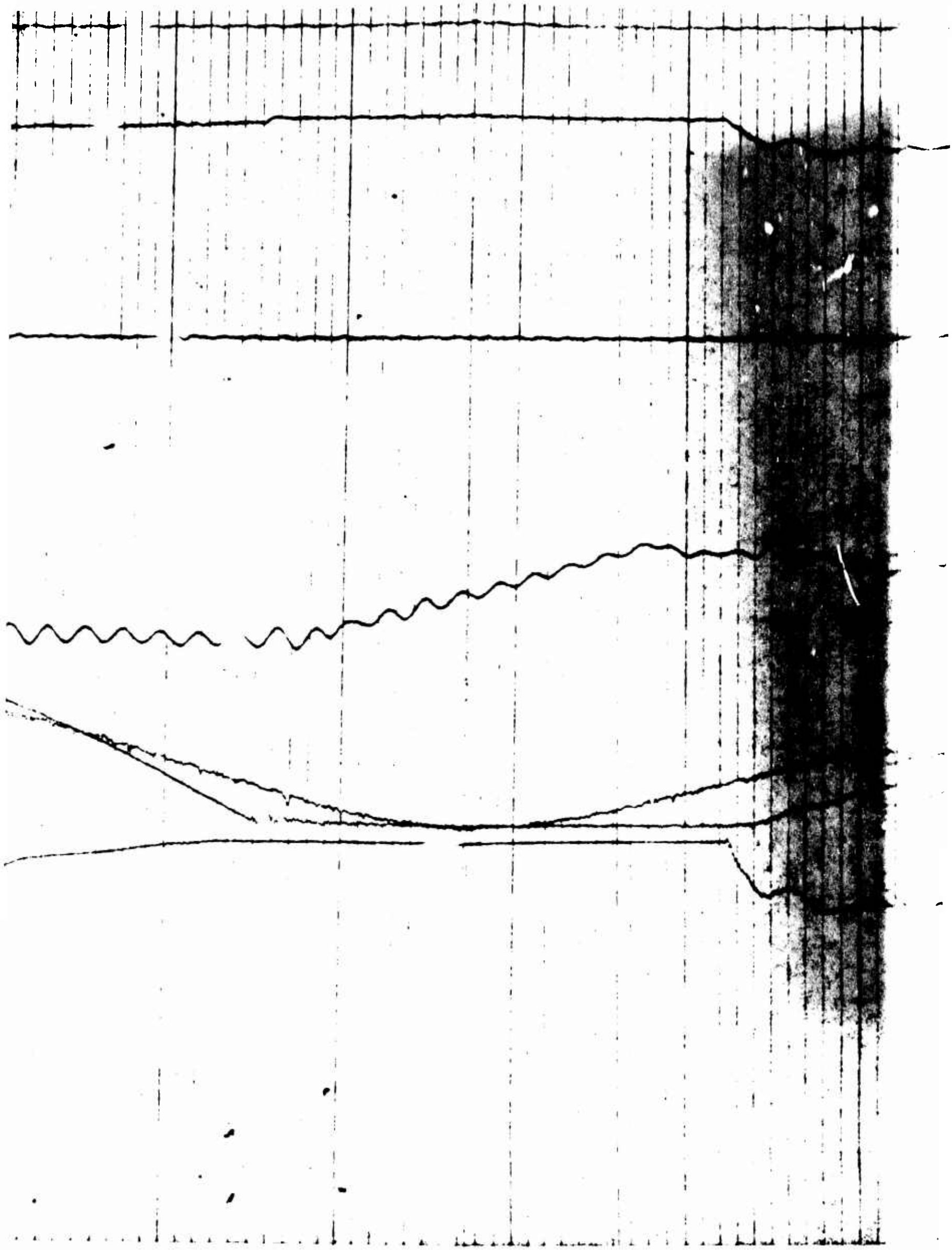
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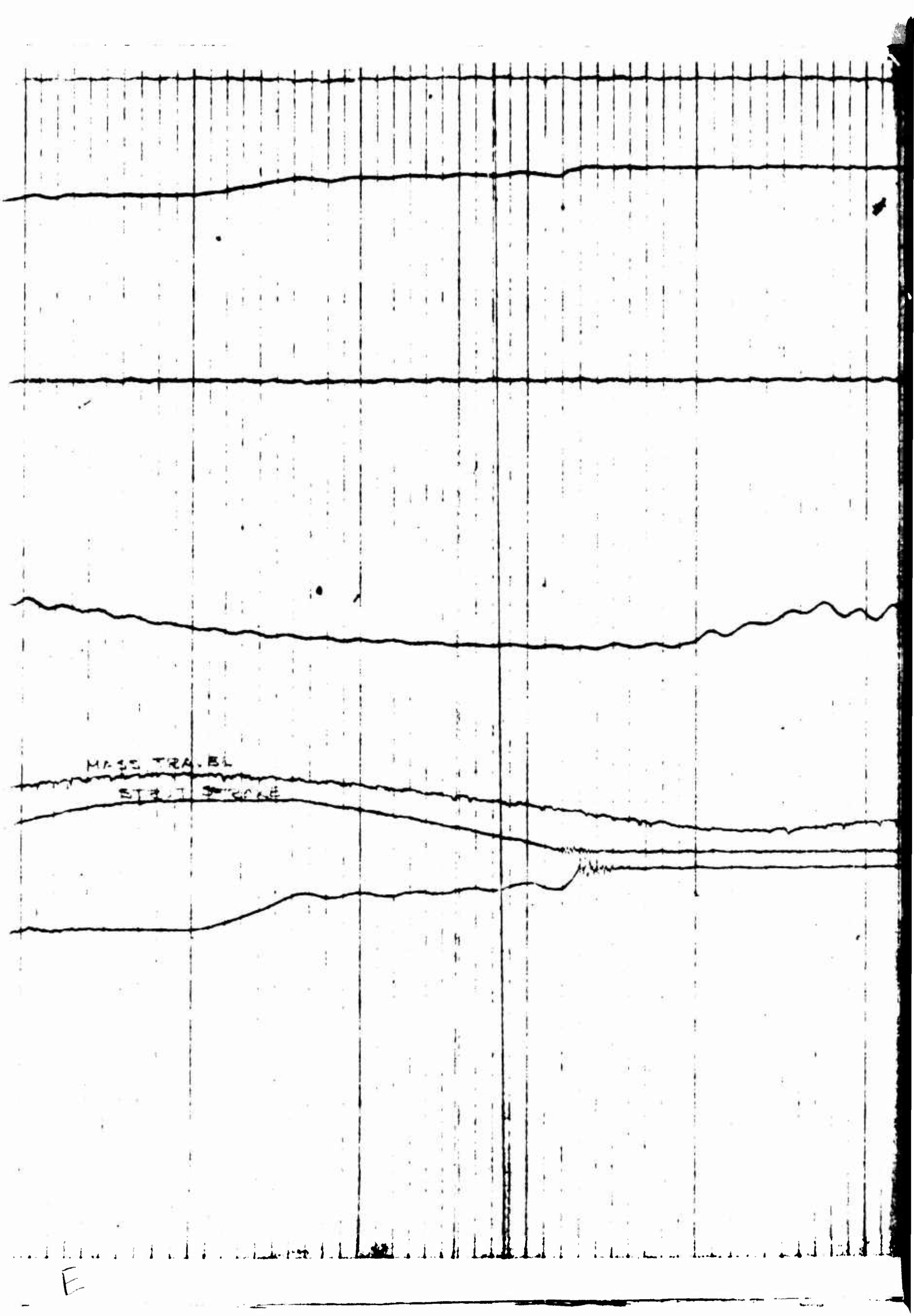
MASS TRA. BL
STR. J SCALE
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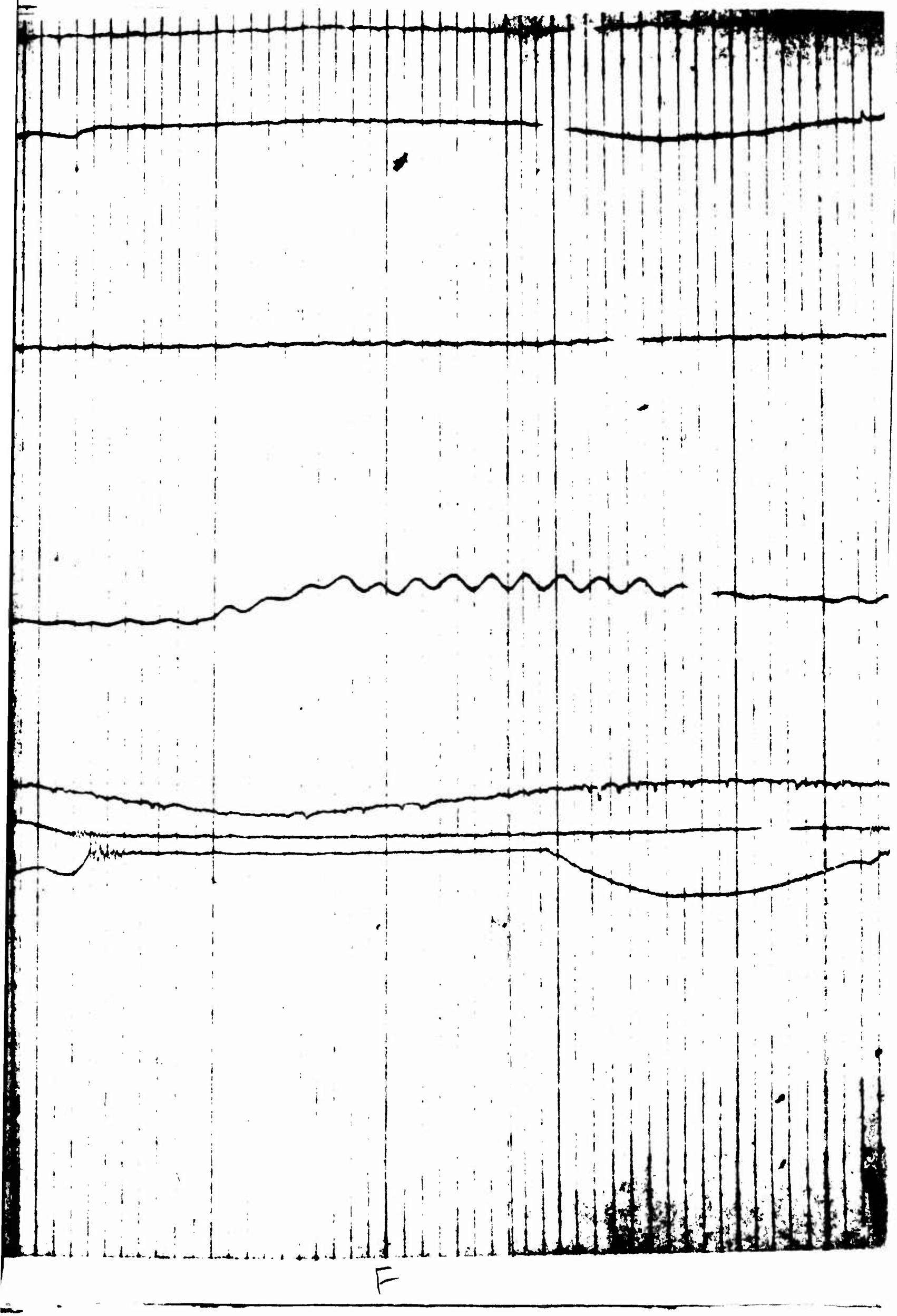

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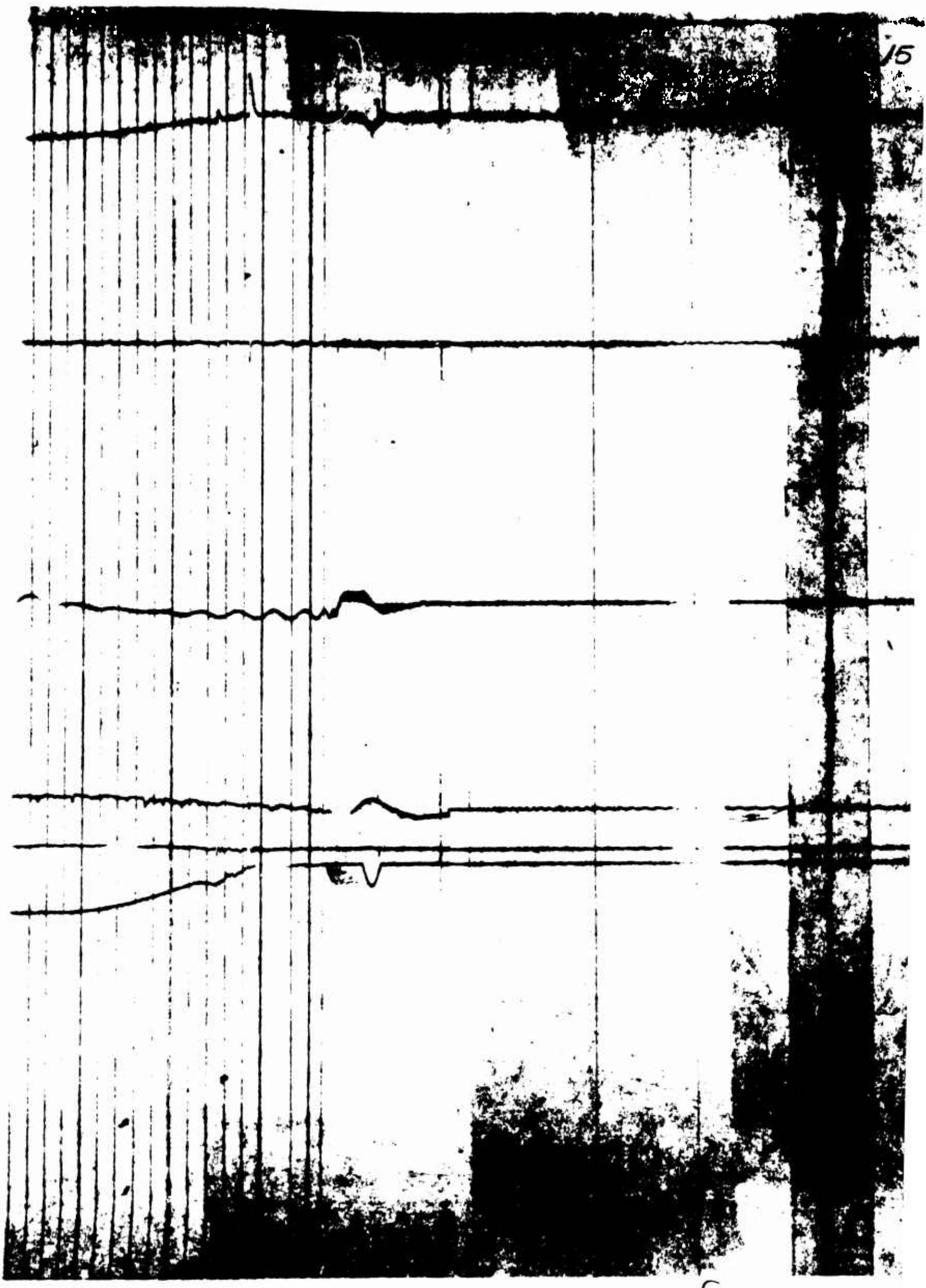
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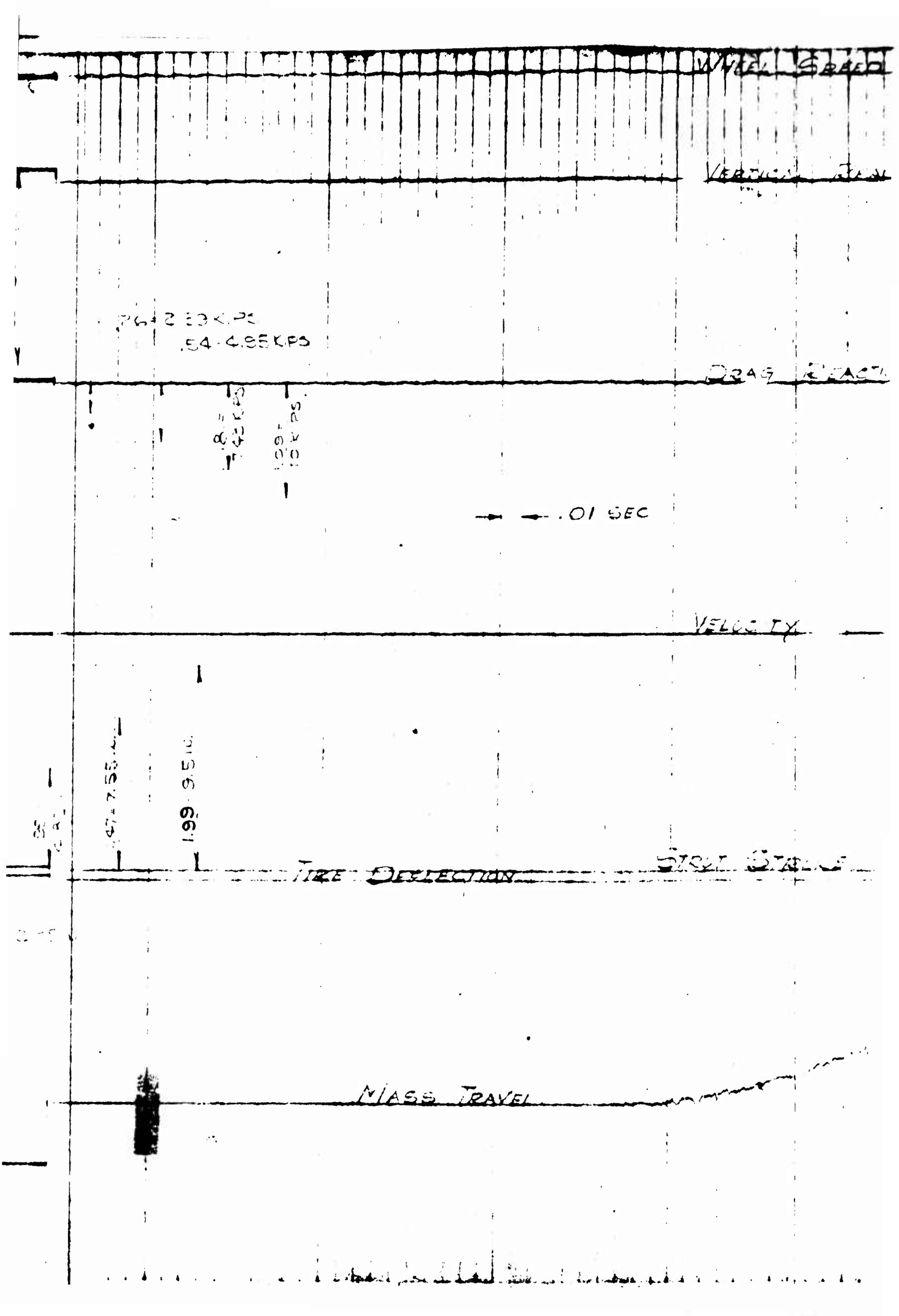
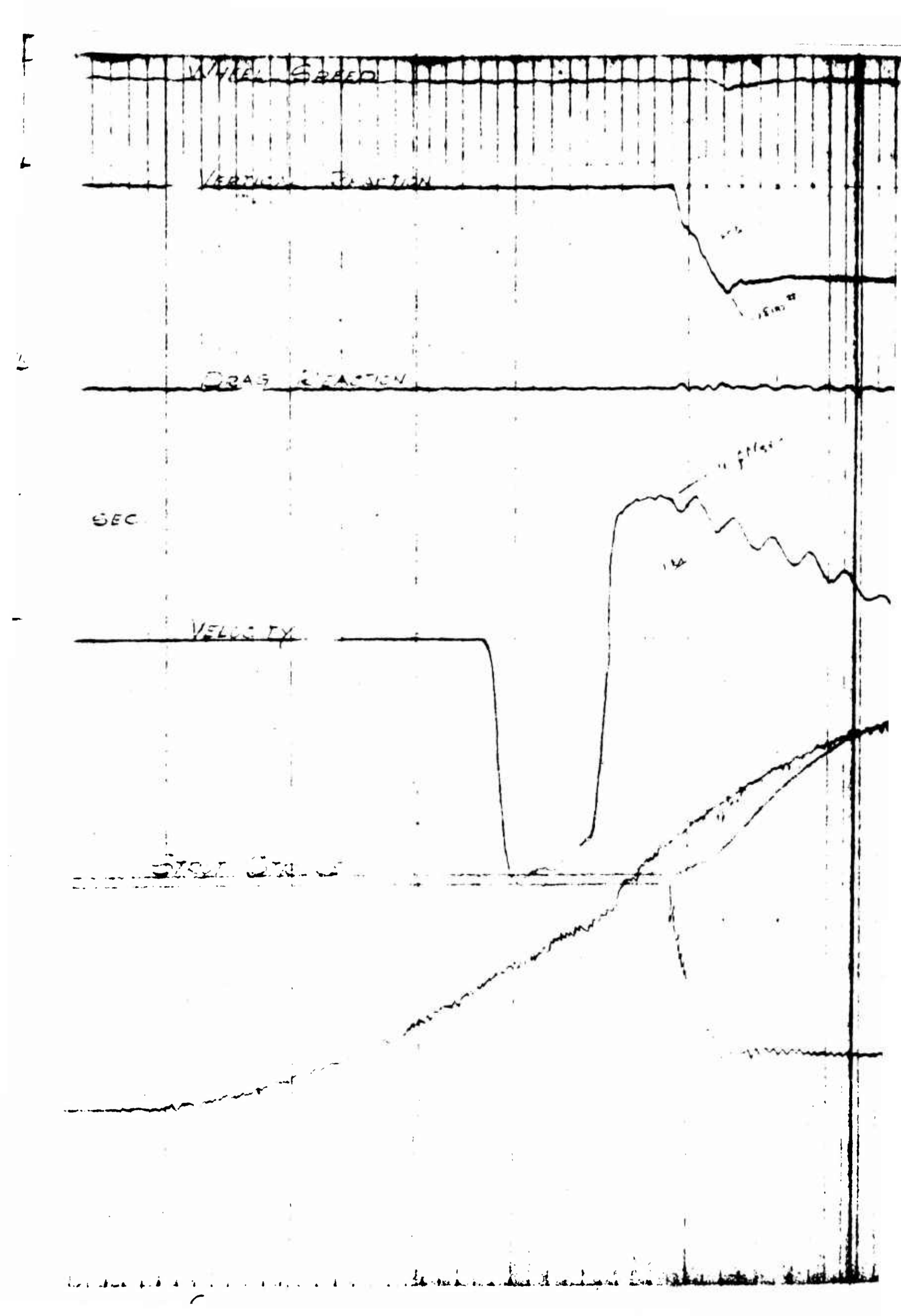
167 PSIG INFLATION PRESSURE

9.9 KIPS


.54-4.85KPS
.01 SEC
VELOCITY
MASS TRAVEL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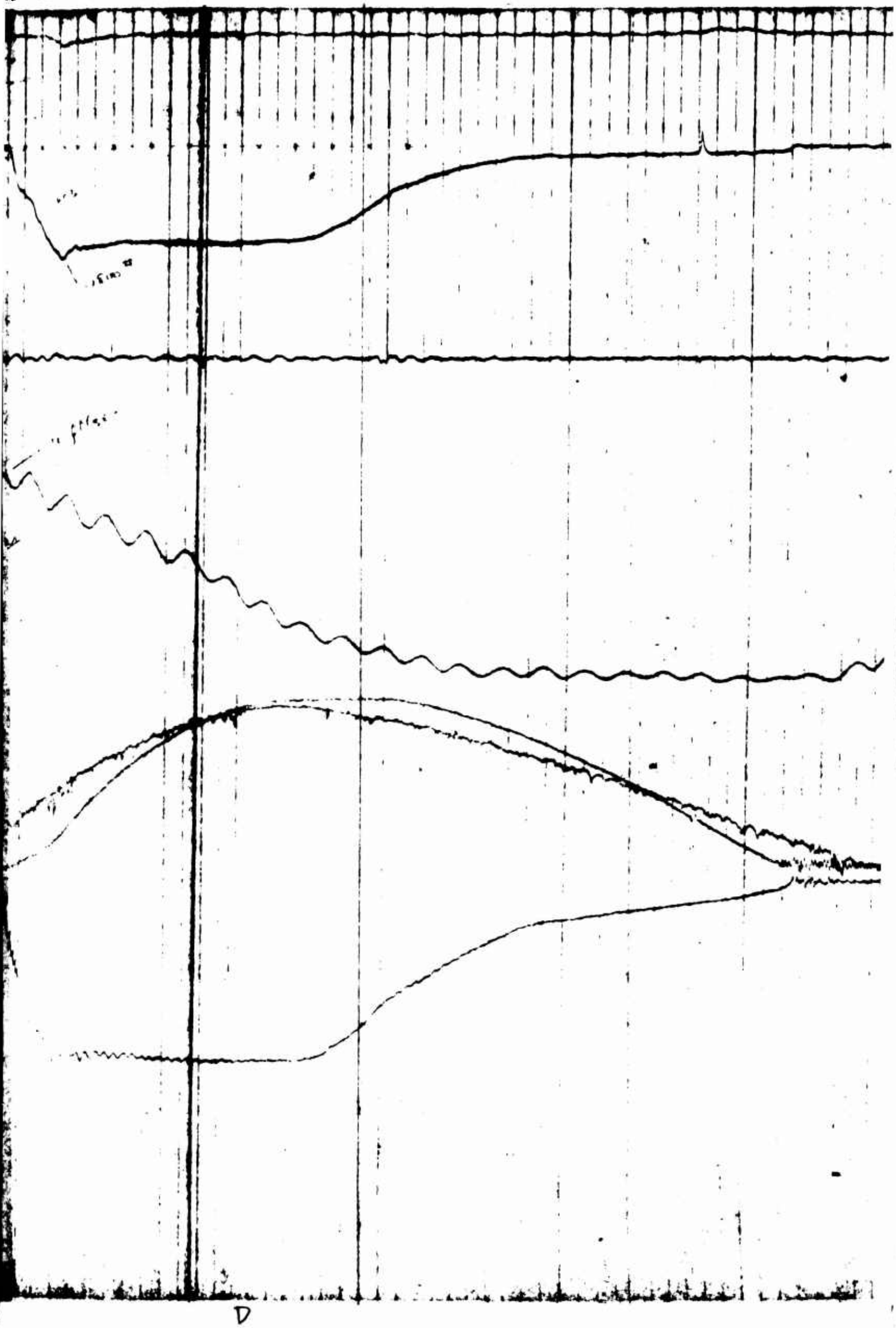
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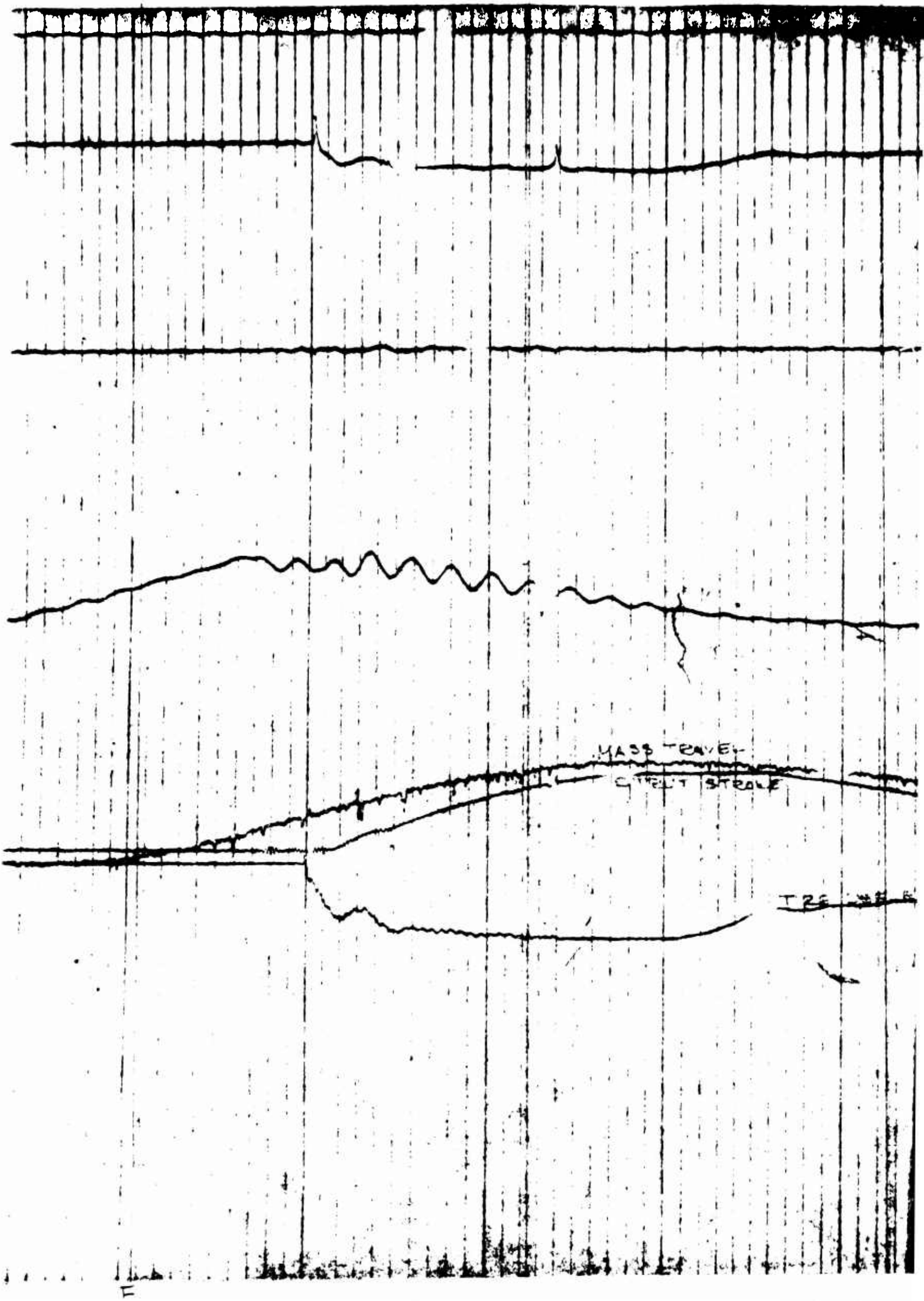
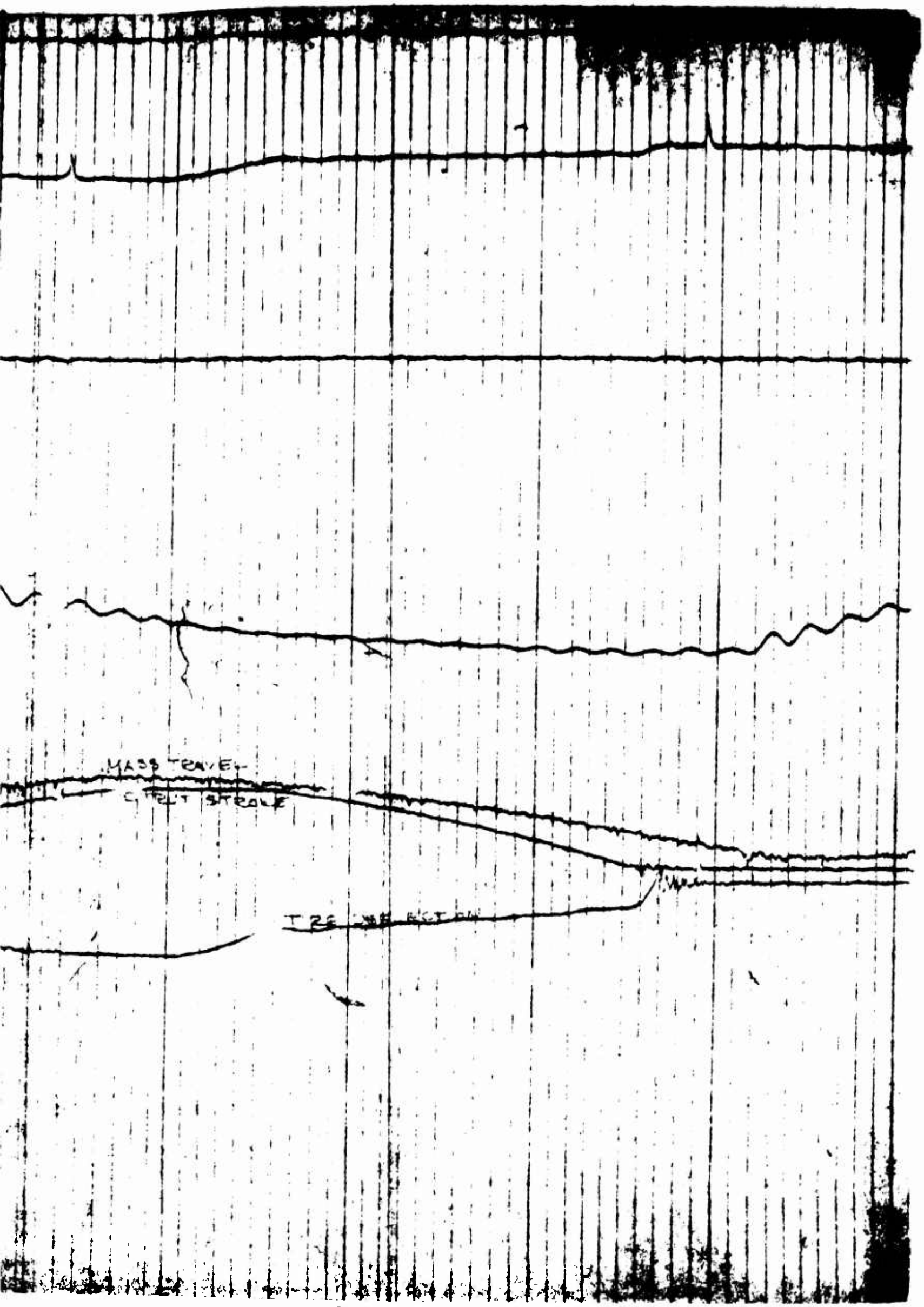

MASS TRAVEL
CIRCUIT STROKE



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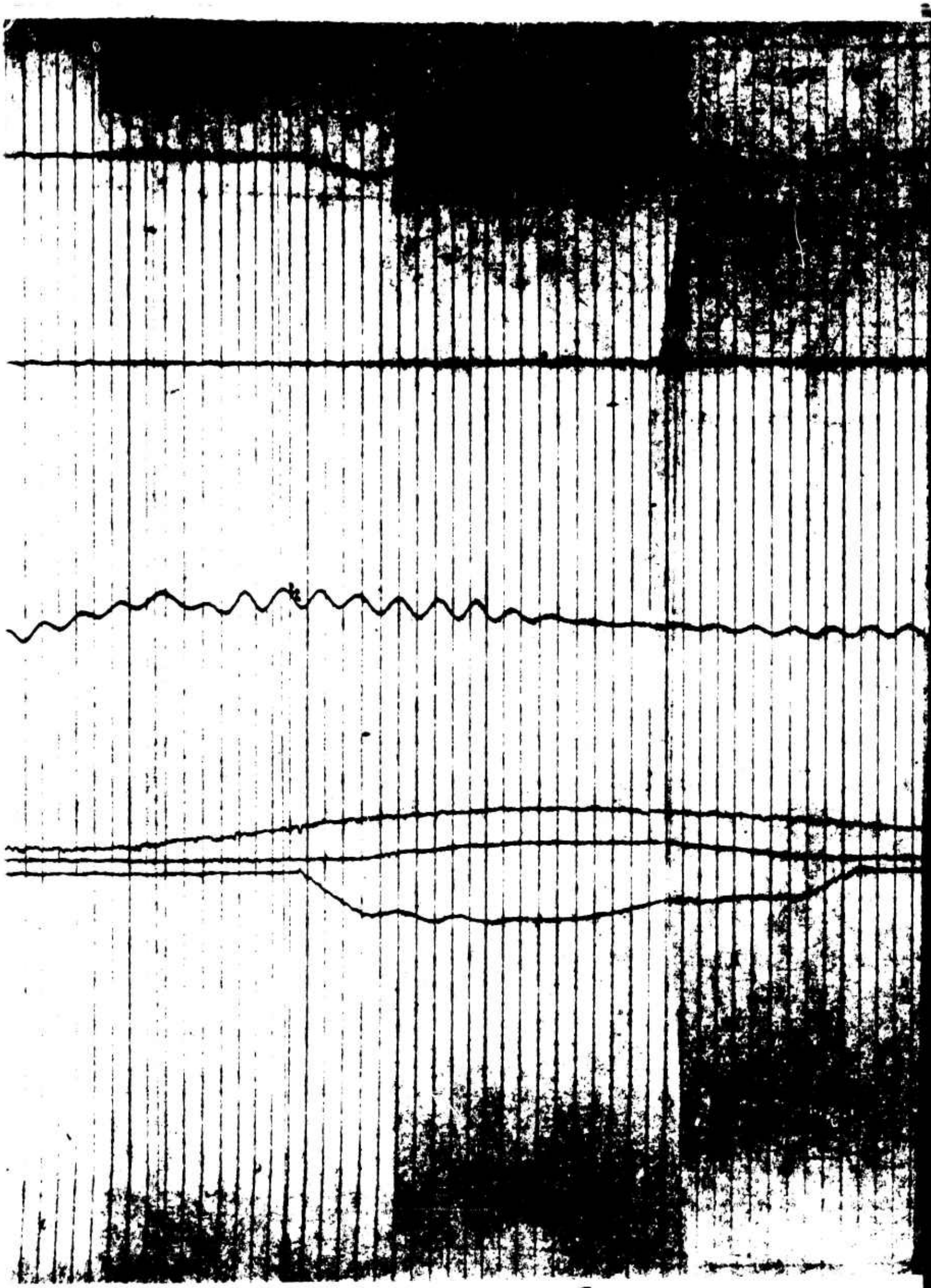


G

APPENDIX A

DROP TEST REQUIREMENT

TABLE I

DROP TEST REQUIREMENTS

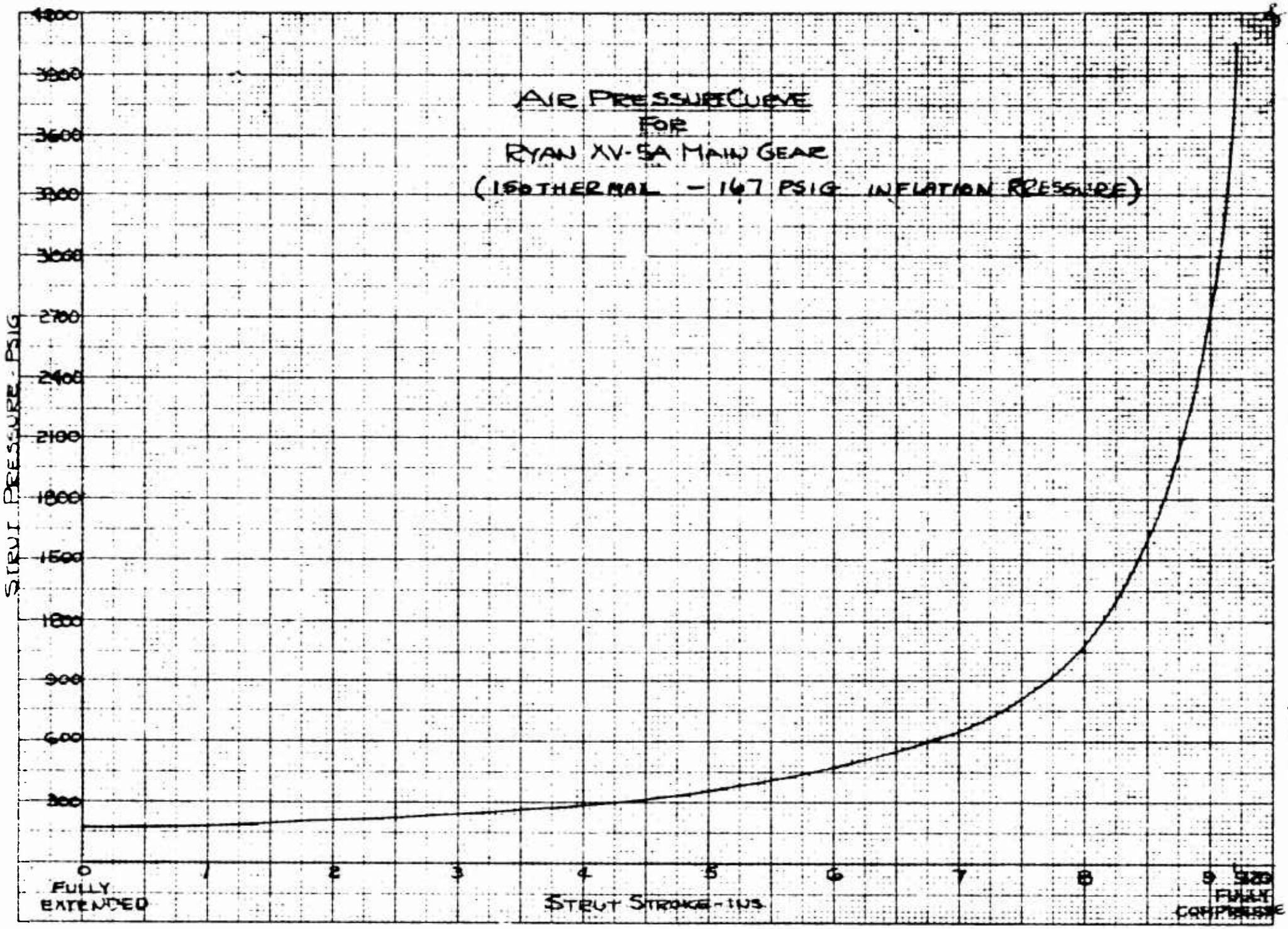
DROP SERIES	CONDITION	A/P WEIGHT (LBS)	EST. JIG WEIGHT (LBS)	CONTACT VELOCITY ± 2% (FT/SEC)	EST DROP HEIGHT (INS)	INPUT ENERGY ± 5% (FT LBS)	* WHEEL SPEED (R P M)	EXT STRUT INFLATION PRESS (PSI)	TIRE PRESSURE (PSI)	MAX VERTICAL GROUND REACTION (LBS)
	2 pt level									
1.	Gear FWD	9200	4600	10	19.7	7143	1971	167	180	12144
	Tail Down									
2.	Gear FWD	9200	4600	10	19.7	7143	1971	167	180	12144
	2 pt level									
3.	Gear FWD	12500	6250	6	7.8	3494	2292	167	180	10200
	2 pt VTOL									
4.	Gear AFT	9200	4600	10	19.7	7143	0	167	180	12144

* Based on 20 in. tire dia.

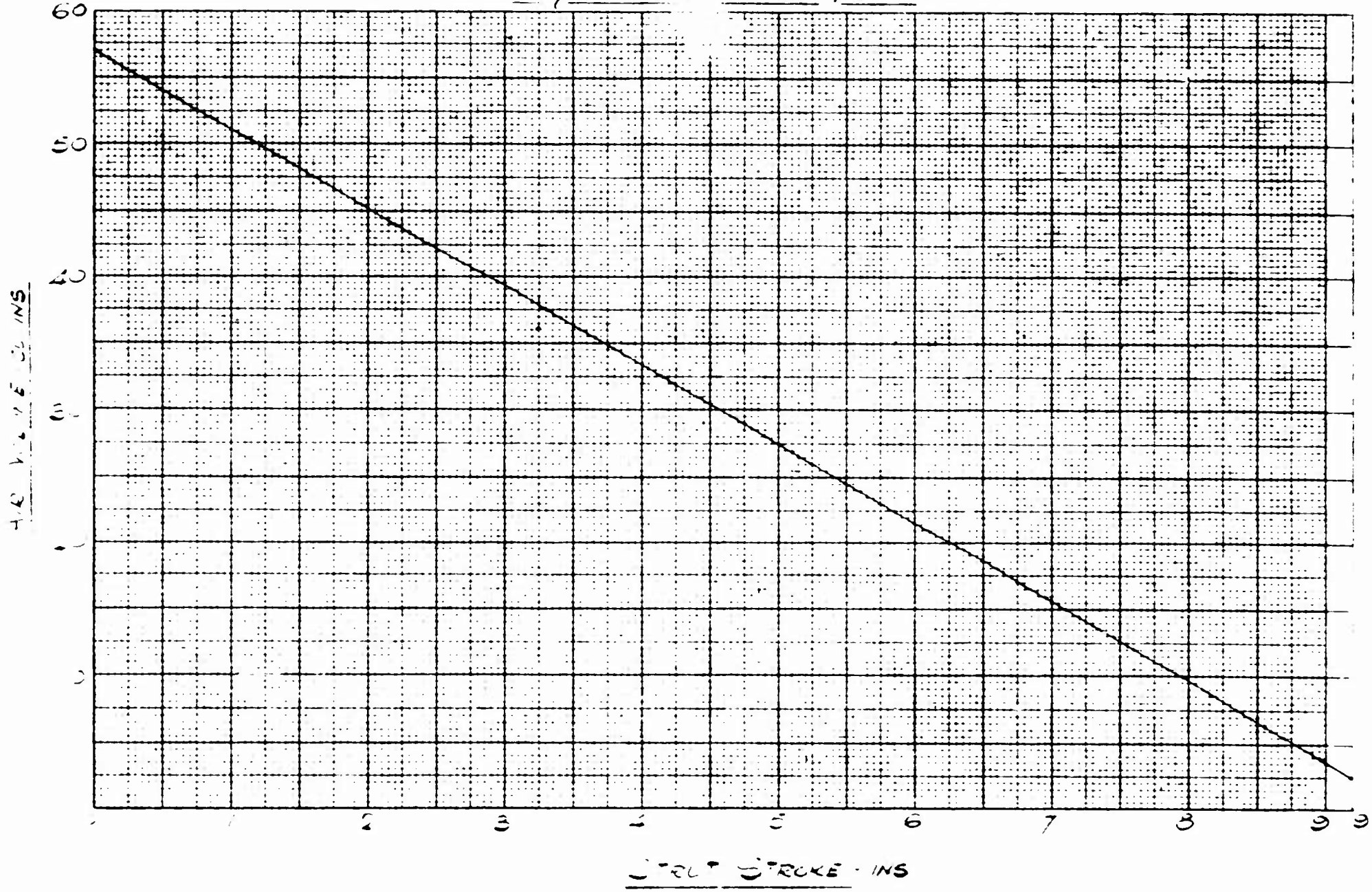
APPENDIX B

BASIC STRUT AIR PRESSURE CURVE

AIR PRESSURE CURVE FOR RYAN XV-5A MAIN GEAR (ISOTHERMAL - 167 PSIG INFLATION PRESSURE)



AIR VOLUME Vs STROKE CURVE
for
RYAN X.V[illegible] MAIN GEAR



B-1